HEALTH INDEX

- Indicator: it shows the direction of progress of health.
- Amalgamation of indicators is known as an Index which measures change

Various Health indices 00:00:30

- Physical quality of life index (PQLI)
- Human developmental index (HDI)
- Gender related development index (GDI)
- Human poverty index (HPI)
- Multidimensional poverty index (MPI)

Indicator components	PQLI	HDI	GDI
1	IMR	Knowledge	Equally distributed knowledge index
2	Literacy rate	Income	Equally distributed income
3	Life expectancy at 1 year	Life expectancy at birth	Equally distributed life expectancy
Values	0-100	0-1	

- Due to gender disparity in the components of Human Development Index (knowledge, income, life expectancy) and in order to measure the gender disparity, the Gender related developmental index (GDI) is calculated.

- The GDI is the ratio of the HDIs calculated separately for females and males using the same methodology as in the HDI. It is a direct measure of gender gap showing the female HDI as a percentage of the male HDI.
- After calculating HDI and GDI, it was found that both are only used in calculating the Positives in the areas of Knowledge, Income and life expectancy. However, there are a lot of negatives or deprivations or Lacunae in the field of Knowledge, income and life expectancy.
- Therefore, in order to measure the negatives in the areas of Knowledge, Income and life expectancy another index was made called as HPI - Human Poverty Index.
- As the poverty status is not the same in developed and developing countries, 2 types of HPI were made:
  - **HPI 1 for developing countries**
  - **HPI 2 for developed countries**

Indicator	**HPI 1**	**HPI 2**
Lack of knowledge	% of adult illiteracy	% of Adults lacking functional literacy skills

Indecent standard of living (Average of the 3 criteria)	% not having access to safe water % of under 5 children who are malnourished % not having access to health services	% who are below poverty line (BPL) % who are unemployed for long term (lasting 12 months or more)
Lack of longevity	**% dying before 40 years**	**% dying before 60 years**

HDI 00:03:04

- Under HDI, (i) Knowledge, (ii) Income and (iii) Life expectancy are calculated.
- In" **KNOWLEDGE**", an average of 2 things are considered:
- Mean years of schooling- (on an average when a person reaches 25years, number of years that he spent in school)
- Expected years of schooling (by age of 18, how many years this child will be spending in school?)
- **INCOME** is calculated as - Gross national income (GNI) per capita
- **LIFE EXPECTANCY** is calculated as - life expectancy at birth

Formula 00:17:10

Actual value – minimum value
/
Maximum value – minimum value

- This means, a minimum and maximum value is fixed for Knowledge, Income and Life expectancy, whereas, the actual value is taken from each country.
  - HDI – Geometric mean of 3-dimension indices

- I life1/3 × IEducation1/3 × IIncome1/3

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Indicator	**Minimum**	**Maximum**
Knowledge (Education index) i. Mean years of schooling ‘ ii. Expected years of schooling	0 0 0	0.978 (New Zealand 2010) 15 (UNDP 2016) 18
Income GNI per capita	100$	75000$ (2011 PPP $)
Longevity	**20**	**85 (UNDP 2016)**

Life expectancy at birth		

- ***For life expectancy, minimum is 20 years and maximum is 83.4 years***
- Knowing the above, K-index, I-index and L-index can be calculated.
- Formula for HDI is: $3\sqrt{K}_{index} \times I_{index} \times L_{index}$
- Latest HDI of India (2019) is **0.647**
- India ranks **129 out of 189** in the list.
- India dropped to 131 in 2021 as per UNDP ranking.
- Norway ranks 1
- Switzerland ranks 2

Multidimensional Poverty Index (MPI) 00:21:00

- To capture multiple deprivations of the poor.
- Values range from 0-10 → 0 means minimum deprivation
  → 1 means highest deprivation
- MPI has replaced HPI
- **India scored 0.123 in MPI 2020 with a rank of 62.**
- 27.5% of Indians are poor according to MPI

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DIMENSION	INDICATORS DEVELOPING
K (Education)	i. Years of schooling ii. School attendance
L (living standards)	i. Water ii. Electricity iii. Cooking fuel iv. sanitation v. Housing vi. Asset
L – longevity (health)	i. Child mortality ii. Nutrition

Niti Aayog Health Index of India (NEW UPDATE)

00:26:00

- The Health Index is a composite score of multiple indicators (23 for large states, 19 for small states and 18 for UTs) covering key aspects of health sector performance
- IN INDIA, IT IS **CALCULATED SEPARATELY** FOR EACH STATE AND UNION TERRITORIES
- Under **NITI AAYOG**, states are divided into **LARGER AND SMALLER STATES.**

- LARGER STATES -**21 STATES**
- SMALLER STATES- **GOA, ARUNACHAL PRADESH, MANIPUR, MIZORAM, MEGHALAYA, NAGALAND SIKKIM, TRIPURA.**
- UNION TERRITORIES -7

Indicators-weighted averages of 3 domains

i. Health outcomes (70%)

ii. Key inputs and processes (18%)

iii. Governance and information (12%)

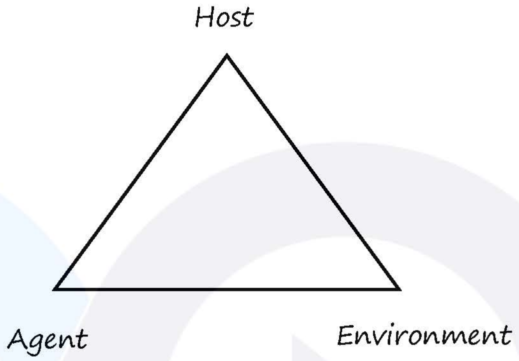
COMPARE AND CONTRAST BETWEEN TERMS

1.Disease

2.Impairment

3.Disability

4.Handicap



1.Control

- In control, host, agent, environment is there and disease transmission is also there, but at a level where it ceases to be a public health problem
- Disease is there to such an extent that it does not disturb any body

2.Elimination: - Agent, Host and environment is there, but you are interrupting the disease transmission

3.Eradication

- Tearing out by root of disease-causing agent by exterminating the agent
- If you remove agent from triad, it becomes eradication
- Small pox is successfully eradicated

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- If anyone from the triad is taken out → causes eradication

Control	Elimination	Eradication
Reducing transmission of disease agent to low level that it ceases to be a public health problem	Complete interruption of transmission of disease in a defined geographical area, but agent persisting somewhere	Tearing out by root of a disease by complete extermination of agent
Aims at reducing incidence and duration of disease, effect of infection, financial burden	Geographical term, used only for country or region	Global term, used only for whole planet
Dengue, chikungunya	Guinea worm, leprosy, yaws in India	Small pox only. 3 next target diseases are polio, measles, guinea worm

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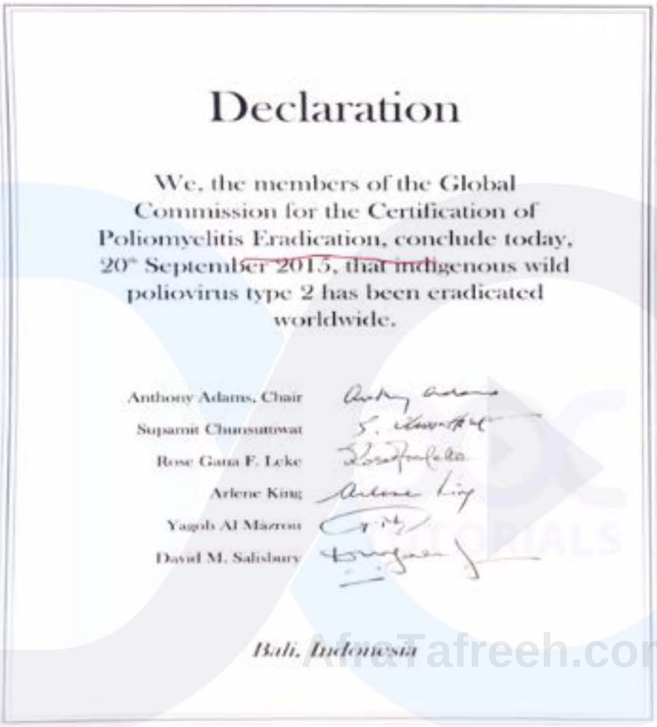
Disease eliminated from India

- Guinea worm – Feb 2000
- Leprosy – Dec 2005
- Yaws – Sep 2006 (declared by India)
- Polio –March 27 2014

Disease eliminated from India

- Neonatal tetanus – May 15, 2015
- Polio virus 2-globally certified as eradicated on 20 Sept 2015



Declaration

We, the members of the Global Commission for the Certification of Poliomyelitis Eradication, conclude today, 20th September 2015, that indigenous wild poliovirus type 2 has been eradicated worldwide.

Anthony Adams, Chair
Supamit Chunsuttiwat
Rose Gana F. Leke
Arlene King
Yagob Al Mazrou
David M. Salisbury

Bali, Indonesia

- WHO South-East Asia Region eliminates Maternal and Neonatal Tetanus on 19 May 2016
- In May 2016, WHO certified India yaws free
- India declared Trachoma free in December 2017
- Type 3 wild poliovirus was declared eradicated on 24 October 2019.

Isolation vs quarantine 00:13:11

- Isolation: - It is for diseased person and physically separate the diseased person, isolate him/her for the maximum period of infectivity / communicability
- Quarantine: - It is for apparently healthy person

Isolation	Quarantine
1. Diseased person 2. Physically separating 3. Communicability / infectivity period	1. Contact 2. Restricting movement 3. Incubation period

Surveillance and monitoring 00:18:30

Monitoring	Surveillance
One time	Continuous
Not an expert	Done by an expert
No feedback	Feed back present
No inbuilt action	Inbuilt action present
Stops after disease elimination	Continues even after disease elimination
Smaller application	Wider application

Q. Disease eliminated from India are all except

A. Small pox
B. Guinea worm
C. Yaws
D. Measles ✓
E. Polio

Q. All the statements about quarantine are true except

A. Synonymous with isolation ✓
B. Absolute quarantine is restriction during IP
C. Exclusion of children from schools is modified quarantine
D. Should not be longer than longest IP

Q. Continuous scrutiny of factors that determine the occurrence and distribution of disease and other conditions of ill-health is the definition of

A. Monitoring
B. Surveillance ✓
C. Disease control
D. System analysis

INTRODUCTION TO EPIDEMIOLOGY

Definition

- Epidemiology – The study of the **distribution (clinical features)** and **determinants (risk factors)** of health-related states and events in specified populations and the application of this study to the control of health problems.
- So, epidemiology means the study of people who are diseased.
- Aim of epidemiology: As per IEA 3 main aims:
  to describe the distribution and magnitude of health and disease problems
  b. to identify etiological factors (risk factors) in the pathogenesis of disease
  c. to provide the data essential to the planning, implementation and evaluation of services for the prevention, control and treatment of disease.

Q. What does an epidemiologist study?

- **Answer:** They mainly study 3 things
  i. Frequency
  ii. Distribution/Clinical features associated with the disease
  iii. Risk factors / Determinant
- Frequency of a disease is studied under the following topics:

i. Mortality
ii. Morbidity
iii. Disability

- We explain distribution under 3 broad headings
  i. Person {child or adult (males or female)}
  ii. Place (if its effecting urban, rural or tribal area)
  iii. Time (seen during summer, winter or rainy season)
- **Descriptive epidemiology**
  - Studying about frequency and distribution of disease under - person, place, time
  - **Descriptive epidemiology helps in formulation of etiological hypothesis**
- **Analytical epidemiology**
  - Studying about risk factors- in terms of people and places affected and the time at which they are noticed
  - In analytical epidemiology the hypothesis is tested i.e., finding risk factors and its relation to disease outcome
  - **Analytical epidemiology helps in testing of etiological hypothesis.**

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The basic tools of measurement in epidemiology are:

1. **Rates**
2. **Ratios, and**
3. **Proportions**

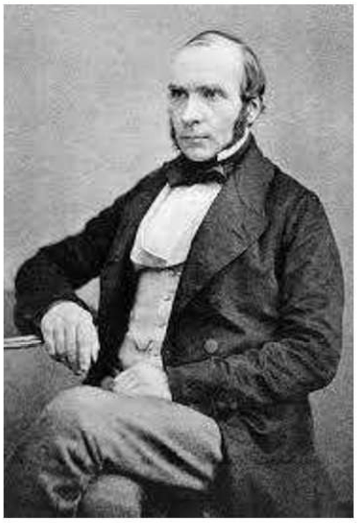

Fig: 1

IBQ

- **Dr. John Snow** – Father of Modern epidemiology
- He is known for describing an etiology behind **cholera**
- Around 600-700 people died of cholera in the first week and Dr. John Snow was appointed by the London government to investigate more about the disease and control it
- John snow did not believe the miasma theory and decided to investigate it in epidemiological view. He first decided to simply describe the disease by time place and person
- First, he drew a picture of the geographical are affected that is George Street, Golden square

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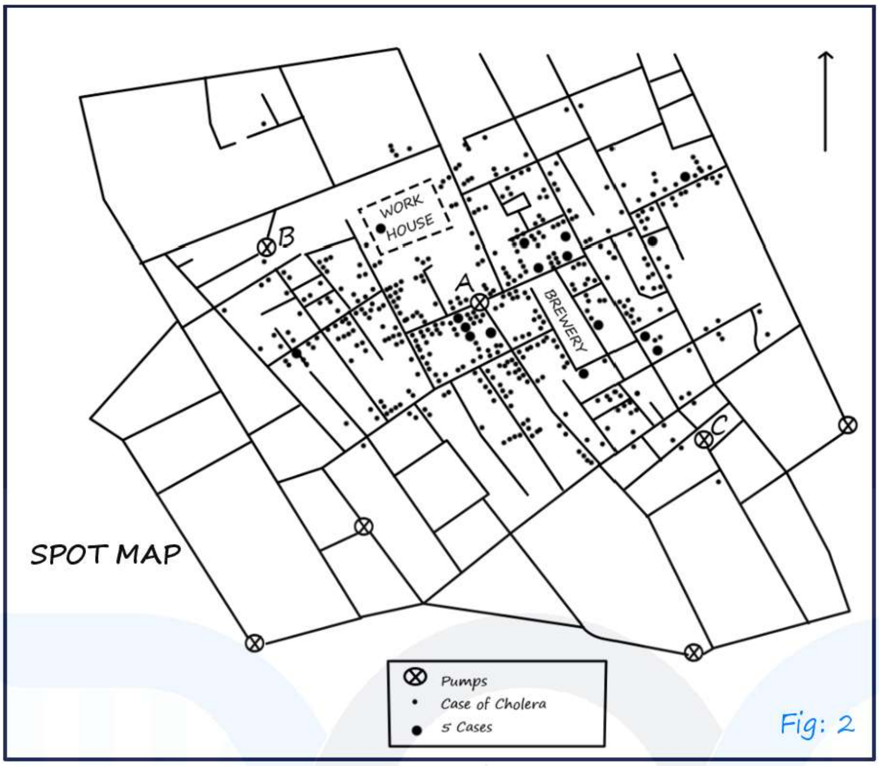
WORK HOUSE
B
A
BREWERY
C
SPOT MAP
Pumps
Case of Cholera
5 Cases

Fig: 2

- He did a "case control study" (a type of analytical study) where he visited houses with and without Cholera, and devised a hypothesis that it was occurring due to water contamination and only in a particular season (i.e., rainy season)
- He also found that a particular Pump, drawing water in the town was the primary cause of spreading the disease.

Fig: 3

Broad Street Pump in, London

  - This particular pump (fig-3) was downstream the common river of the town that was collecting sewage from the entire town thus causing Cholera in people residents of Soho district using that water.
  - Dr. John Snow documented evidence suggested that contaminated water from this pump was the source of the epidemic; he caused removal of the handle, and the already declining epidemic due to people leaving the area, ceased entirely.

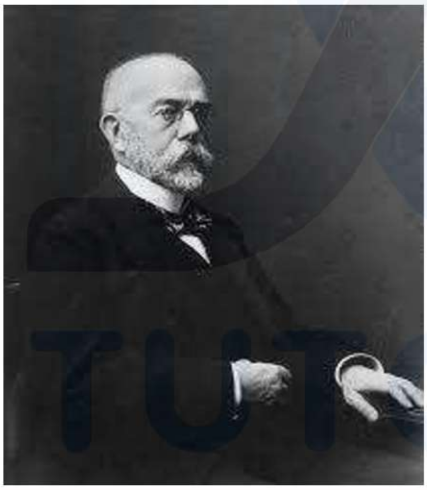

Fig: 4

IBQ

- In 1883 a German physician, Robert Koch, took the search for the cause of cholera a step further when he isolated the bacterium Vibrio cholerae, the "poison" Snow contended caused cholera.
  - **Shoe Leather Epidemiology**- epidemiology practiced in field/ intervention epidemiology

- Here investigations initiated in response to urgent public health problems and for which the investigative team does much of its work in the field
- CDC Atlanta has a wing practicing shoe leather epidemiology called **Epidemic Intelligence Services (EIS)** also known as **disease detectives**

THE DISEASE DETECTIVES
EIS

Fig: 5

MORTALITY

1.Mortality

2.Morbidity

3.Disability

Mortality 00:02:04

Fig: 1

1.Crude death rate

Total number of deaths X 1000

Midyear population

Midyear → July first

2.Specific death rate

Number of deaths from a specific disease / group (age & sex) X 1000

Midyear population

3.Proportional mortality rate

Total no: of deaths due to a specific disease X 100

Total no: of deaths from all causes in that year

4.Case fatality rate

Total no: of deaths due to a particular disease X 100

Total no: of cases due to same disease

- Killing power of disease
- Related to virulence

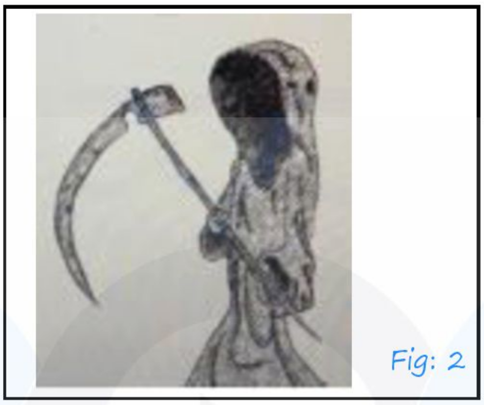

Fig: 2

5.Survival rate

Fig: 3

No: of patients alive after 5 years X 100

No: of cases diagnosed / treated

- SR = 1-CFR
- CFR = 1-SR
- CFR → For acute diseases
- SR → for chronic disease

6.Years of potential life lost

Measure of premature death

Q. Fifty people are suffering from cholera in a population of 5000. Out of 50 cholera patients 10 died. The total deaths are 50. Calculate death rate.

A. 1 per 1000

B. 5 per 1000

C. 10 per 1000 ✓

D. 20 per 100

$$CDR = \frac{50 \times 1000}{5000}$$

$= 10/1000$

Q. In an Asian country with population of 6 million people, 60,000 deaths occurred during the year 2005. These included 30,000 deaths from cholera in 1,00,000 people who were sick with cholera. The cause specific mortality rate and case fatality rate from cholera in 2005 are respectively.

A. 30% and 5/1000

B. 5/1000 and 30% ✓

C. 30/1000 and 5%

D. 5% and 30/1000

- MYP-60,00,000
- Total no: of cholera cases = 1,00,000
- Total no: of deaths = 60,000
- Total no: of cholera deaths = 30,000

Cause specific mortality rate of cholera =

No: of deaths from cholera X 1000
Mid-year population
30,000 X 1000 = 5/1000
6,00,000

Case fatality rate of cholera =

Total No: of deaths due to cholera X 100
Total no: of cases of cholera
30,000 X 100 = 30 per 100 or 30%
1,00,000

Q. Rabies is a 100% fatal disease is an expression of which of the following.

A. CD
B. Specific mortality rate
C. Case fatality rate ✓
D. Proportional mortality rate

INTERNATIONAL DEATH CERTIFICATE

- Uniform tool available at international level for writing a death certificate

Parts of international death certificate 00:00:06

It has 2 parts:

- Part **I**
  - Immediate cause of death-cause directly leading to death **(a).....**
  - Intermediate cause of death-because that triggers the direct cause (b).....
  - Underlying cause of death-the disease starting events leading to death (c).......
  - (d)........
  - b, c, d are antecedent causes of death
- Part **II**
  - Significant cause of death- some other disease that also could have contributed to the cause of death but not related to the disease or condition causing it.

International Form of Medical Certificate of Cause of Death

Cause Of Death		Approxlmate interval between onset and death
I. Disease or condition directly leading to death Antecedent cause Morbid conditions, if any giving rise to the above cause sating the underlying condition last	a)…………………. Due to (OR as a consequence of) b)…………………. Due to (Or as a consequence of) c)………… Due to (Or as a consequence of) d) …………………….	…………………………………. …………………………………… …………………………………… ……………………………………
II. Other significant conditions contributing to the death, but not related to the disease or condition causing it	………………………………… ………………………………	…………………………………… ……………………………………
This does not mean the mode of dying e.g., heart failure, respiratory failure it means the disease, injury or complication that caused death		

- In **Part1** under 1(a) we write the immediate cause of death.

  1(b) we write the intermediate cause of death

  1(c) we write the underlying cause of death

- On the right side of the form, we write the approximate time interval between each of these events
- In **Part2** we write any other significant disease that could have led to death.
- **1(c) is known as essence of death certificate**
- But cause of death need not be 1c all the time.
- Cause of death is taken as the last cause written in part1 it could be 1a,1b, 1c, 1d etc.

Eg.1 In a case of chronic cause of death:

- DM patient with diabetic nephropathy with renal failure who dies of cardio pulmonary arrest.
- Here the immediate cause of death (1a) is Renal failure
- The intermediate cause (1b) is diabetic nephropathy
- The disease which led to the chain of events leading to death is DM (1c)

Eg.2 A chronic DM patient who developed diabetic neuropathy followed by diabetic ulcer and died of septicemia

- In such a case the immediate cause of death is septicemia (1a)
- We have 2 intermediate causes here one is diabetic ulcer and the other is diabetic neuropathy and the underlying cause of death would be DM (1b and c)

- So 1c may not be the cause of death all the time it may even be 1b or 1d

Exercises

- Underlying cause in this case is - Advanced Pulmonary tuberculosis
- Other significant cause - generalized arteriosclerosis

Frame A: Medical data Part1 and 2			
1 Report disease or condition directly to death on line a		**Cause of death**	**Time interval from onset to death**
	a	Pulmonary hemorrhage	10 Hour
Report claim of events in due to order (if applicable)	b	Advanced pulmonary tuberculosis	8 years
	c		
State the underlying cause on the lowest used line	d		
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)		Generalized arteriosclerosis (unknown)	

- Cause of death here is – Duodenal Ulcer
- Intermediate causes are–right sub phrenic abscess (1b) and perforated duodenal ulcer(1c)
- Immediate cause is septic shock(1a)
- Other significant cause of death is– chronic alcoholism (10years)

Frame A: Medical data Part 1 and 2			
1 Report disease or condition directly to death on line a		**Cause of death**	**Time interval from onset to death**
	a	Septic shock	2 hours
Report claim of events in due to order (if applicable)	b	Right Sub-phrenic abscess	1 day
	c	Perforated duodenal ulcer	5 days
State the underlying cause on the lowest used line	d	Duodenal ulcer	3 years
2. Other significant conditions contributing to death		Chronic Alcoholism	

(time intervals can be included in brackets after the condition)	

- Cause of death here is- RTA(1c)
- Intermediate cause here is- Multiple fractures(1b)
- Immediate cause of death here is traumatic shock(1a)
- But we will always say cause of death is Road traffic accident (RTA) i.e., 1c.

MORBIDITY MEASURES

Morbidity

- Any deviation from normal health.
- Morbidity could be measured in terms of 3 units –
  a)persons who were ill
  b)the illnesses (periods or spells of illness) that these persons experienced
  c)the duration (days, weeks, etc) of these illnesses.
- Prevalence and incidence are 2 parameters used to check the morbidity
- **Prevalence** = Total number of diseases → number of new and old cases of a particular disease
- **Incidence** = Total number of new diseases

$$\boxed{P = I \times D}$$

(Connecting incidence and prevalence)

- P – Prevalence
- I – Incidence
- D – Duration

- Formula of prevalence & incidence

$$\boxed{\text{Prevalence} = \frac{\text{Total number of cases (new \& Old)}}{\text{Estimated population at risk}} \times 100}$$

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$$\textbf{Incidence} = \frac{\text{No. of new cases in a defined period}}{\text{Total population at risk/susceptible in that period}} \times 1000$$

Prevalence 00:08:30

- 2 types
    - **Point prevalence** → Chronic disease (long duration)
    - **Period prevalence** → Acute disease (short duration)

Incidence 00:12:26

- 2 types
    - Attack rate →Same as incidence rate.
    - (Usually expressed as a per cent), used only when the population is exposed to risk for a limited period of time such as during an epidemic.
    - Attack rate:

$$\frac{\text{Number of new cases of a specified disease during a specified time interval}}{\text{Total population at risk in the same time interval}} \times 100$$

-
    - Secondary attack rate→ it is a measure of how many secondary cases have developed after primary cases
- Primary case (very first case) should be excluded from both numerator and denominator

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$$\frac{\text{Number of secondary cases developing disease within one incubation period}}{\text{Total number of Exposed/ susceptible contact}} \times 100$$

- Index case – index case is the one which was initially noticed by people

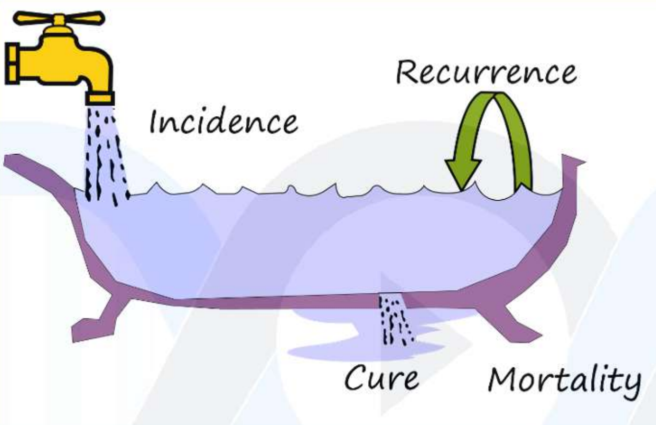

Fig: 1

- As Incidence increases → prevalence increases
- As Recurrence increases → prevalence increases
- As Cure increases → prevalence decreases
- As Mortality increases → prevalence decreases

Different between incidence rate and incidence proportion 00:18:02

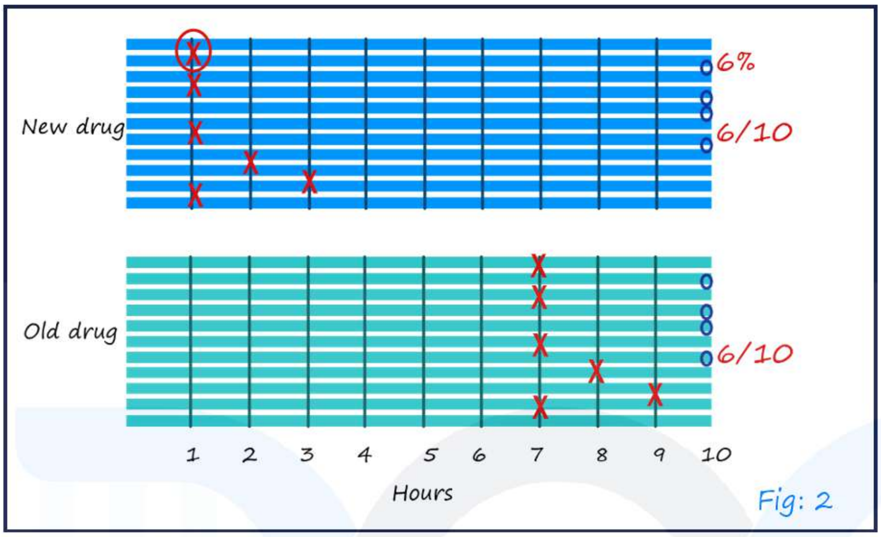

Fig: 2

i. Incidence proportion $= \dfrac{\text{Number of new cases}}{\text{Total person}}$

(attack rate/risk)

ii. Incidence rate – $\dfrac{\text{No. of new cases}}{\text{Total person time}}$

- Total person time → time taken for the outcome to develop
- Person time– How many people being tested would develop reaction to the agent in one particular time. Example: If 100 people were given a pain killer drug and observed for one hour, how many of them develop pain relief in one hour would be "**100 person hours**"

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Incidence rate (NEW)

- Incidence density
- Person time rate
- Person distance rate

DISABILITY FREQUENCY

Disease 00:01:33

- Disease → Impairment → Disability → Handicap
- Disease – Malfunction –
- Impairment → losing anatomical structure & physiological function E.g. **Diabetes mellitus is disease leading to diabetic foot ulcer i.e impairment**
- Disability → Not able to walk
- Handicap → Inability to do routine function → **Unable to do a social role of earning**

Franklin Roosevelt

Fig: 1

Disability 00:03:06

1.DALY

2.HALE

3.QALY

4.Sullivan's Index

DALY 00:07:50

- Disability adjusted life years
- Measures burden of disease in a defined population & effective intervention
- **DALY – YLL + YLD**

    YLL – ***years of life lost*** (Premature death)

    YLD – years lived with disability

Health adjusted life expectancy (HALE) 00:10:30

- Years lived in full health

Quality adjusted life year (QALY) 00:11:20

- Quality of life
- Numbers of years of quality life that could be added by a medical intervention
- Quality + Quantity of life

Stephen Hawking

Fig: 2

Sullivan's Index 00:15:46

- Life free of disability
- Calculated by LE – duration of disability
- Disability free life expectancy (DFLE) /Active life expectancy

TIME DISTRIBUTION

We have mainly 3 types of time fluctuation

00:03:00

1. **Short** term fluctuation also known as **epidemic**
2. **Long** term fluctuation also known as **secular trend: changes in the occurrence of disease (i.e., a progressive increase like CHD, DM, Cancers or decrease like typhoid, diphtheria, polio) over a long period of time, generally several years or decades.**
3. **Periodic** fluctuation- two types-
   - Cyclical: occur in cycles spread over short periods of time which may be days, weeks, months or years. Eg-Influenza pandemic in 7-10yr, Automobile accidents in US on weekend.
   - Seasonal: Due to Seasonal variation of diseases. eg - e.g., measles, varicella, cerebra-spinal meningitis, upper respiratory infections, malaria

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Short term fluctuation

Types of Epidemics:

1. Common source epidemic
   1. Single exposure also known as point source epidemic
   2. **Multiple** /continuous exposure
2. Propagated epidemic

(a) Person-to-person

(b) Arthropod vector

(c) Animal reservoir

3.Slow/modern epidemic E.g., CHD

Epidemic 00:05:00

- Occurrence of cases clerly more than normally expected.
- If **the average number of cases goes greater than Average (mean) + 2SD**. This is when we call it as an Epidemic
- **Single case of a new disease** is also an epidemic.
- **Single case of eradicated or eliminated disease** is also called as an epidemic. (As normal expectation of these cases is 0)

Epidemic curve 00:10:00

- Common-source, single exposure also known as "point-source" epidemics.
- Graph connecting time and number of cases.
- It is a graph with number of cases along the Y axis and time along the X axis.

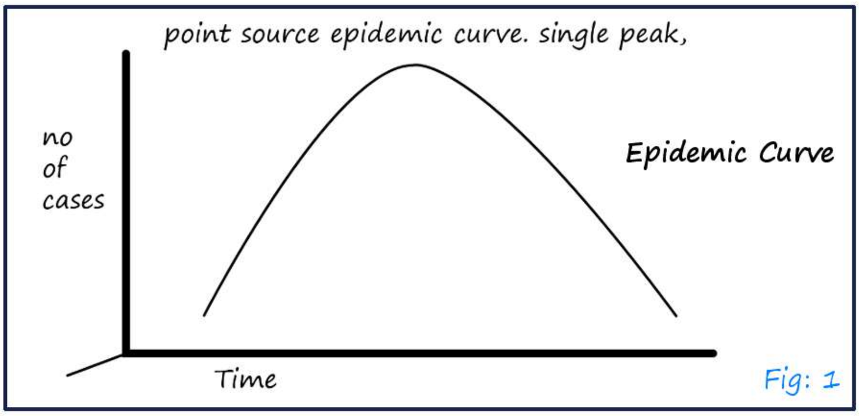


Fig: 1

- E. g. A group of people eat contaminated food at a party, which acts as a source of food poisoning (*common source, single exposure*) and the incubation period of the disease-causing agent is 2hrs to 24hrs and the manifestation is in the form of severe diarrhea and vomiting.
- First symptoms are seen in a few people within 2 hours of consuming the food. As time progresses, the number of people showing the symptoms will slowly increase until a point it becomes an epidemic and then after about 24 hours the number of cases slowly start coming down. This is the usual trend of the curve that is seen
- We have a sharp rise & fall in the curve so it looks like a **peak**, with no secondary waves.
- Since clustering of cases occur within a short interval of time the epidemic tends to be **explosive**.
- all the cases develop within one incubation period of disease.

Features of point source epidemic

- Single peak
- No second wave
- Single incubation period
- Explosive Epidemic

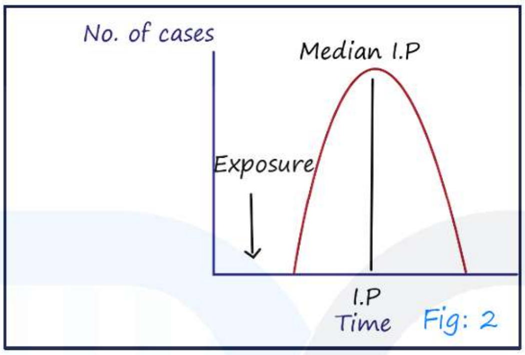


Fig: 2

Other uses of point source epidemic curve

- Tells us the **minimum incubation period**
- We can access **median Incubation period**
- By looking at the shape of the epidemic curve we can find out the **type of epidemic.**

  Eg. e.g., Bhopal gas tragedy in India , Minamata disease in Japan due to high methyl mercury in the fish consumed.

Common source continuous epidemic

- E.g., suppose there is a public well with cholera bacilli and people around that well mainly depend on that well for their water source.

- It is a common source but it is continuously repeatedly giving exposure to people all around so people are exposed to the bacilli multiple times
- epidemics tend to be more extended or irregular.
- A variation to the above model is that an epidemic may be initiated from a common source and then continue as a propagated epidemic. Like Waterborne cholera.
- After the 1st case develops **many other cases develop in the subsequent incubation period.**

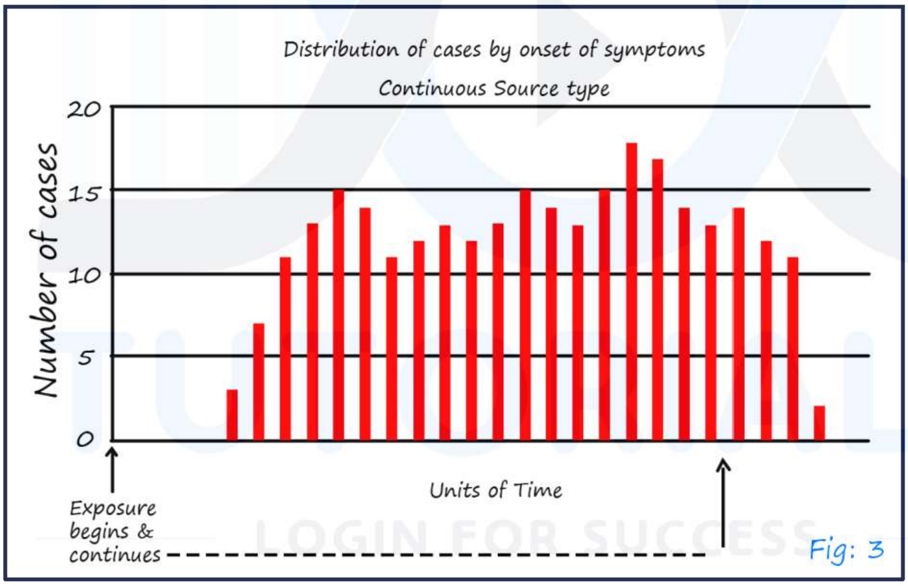


Fig: 3

- So once the outbreak develops it's not coming down as we see in point source epidemic
- In common source continuous epidemic, it remains high i.e., there is a **plateauing at the top.**
- It will **spread for more than 1 incubation period.**

Propagated epidemic

- i.e., from person to person. (e.g. measles, corona)

- The epidemic usually shows a gradual rise and tails off over a much longer period of time.

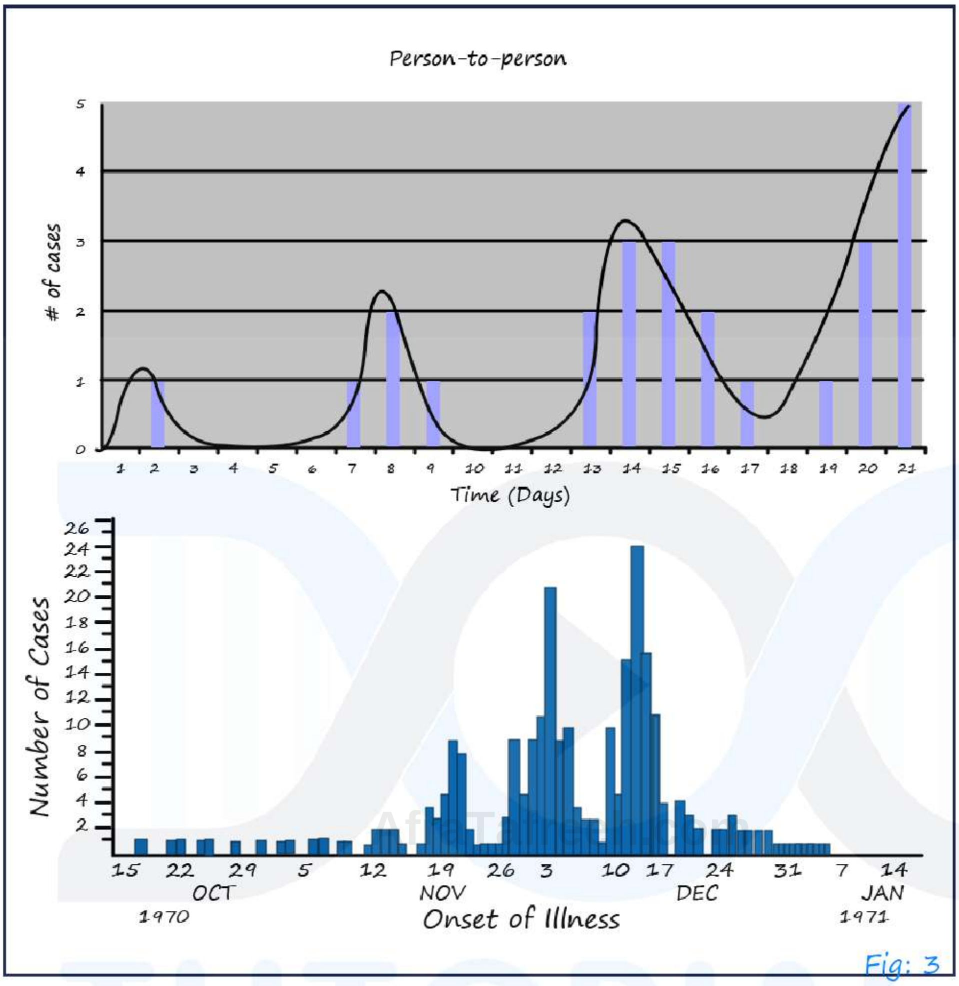
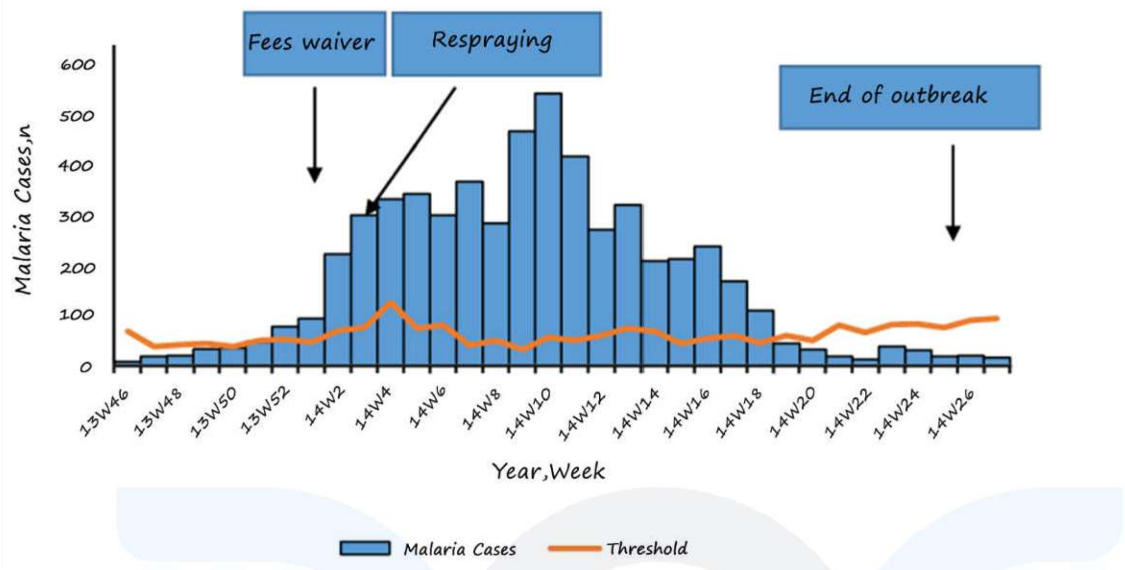


Fig: 3

- As we can see once the epidemic starts it goes on increasing in height.
- They are many secondary waves
- The amplitude (height) of subsequent peaks keeps on increasing.

Endemic Curve 00:19:00



Features of endemic curve

- An endemic curve **never touches the baseline.**
- It is **never a straight line.**

Types of Endemicity 00:20:30

- **Hyper endemic** – seen in all age groups. It refer to a disease which is constantly and persistently present in a population at a high rate of incidence and/or prevalence and which equally affects all age groups of that population. It is one of the various degrees of endemicity.
- **Holoendemic** – seen mainly in children. Disease for which a high prevalent level of infection begins early in life and affects most of the child population, leading

to a state of equilibrium such that the adult population shows evidence of the disease much less commonly than do children. Eg-malaria

- **Sporadic**: scattered or irregular or haphazard E.g. tetanus, Herpes Zoster, polio

Epidemic Investigation 00:22:00

- Whenever there is a disease or epidemic or outbreak as a doctor you are asked to go and do an investigation.
- An epidemic investigation is done in 10 different steps.
  1. Verification of diagnosis
  2. Confirmation of an epidemic
  3. Defining population at risk
  4. Rapid search for all cases
  5. Data analysis
  6. Formulation of hypothesis
  7. Testing hypothesis
  8. Evaluation of ecological factors
  9. Further investigation of population at risk
  10. Writing the report
- AIDS is known as a '**Modern Epidemic**'

DISTRIBUTION- PLACE & PERSON

Family studies 00:01:25

- There are two types of family studies
  - i. Twin studies-monozygotic twins (100% same genetic material) but role of the environment or cultural factors cannot be ruled out. It is predominantly genetic contribution
  - ii. Adoption study-though difficult, it is done in developed countries. Completely genetic contribution

Migration studies: 00:04:00

- It is performed on migrants
- Migrant studies can be carried out in two ways :

  {a) comparison of disease and death rates for migrants with those of their kin who have stayed at home.

  (b) comparison of migrants with local population of the

  host country provides information on genetically different

  groups living in a similar environment.
- Studying/comparing the number of diseases among the migrants with that of residents.

Example-

- Carcinoma stomach is very prevalent in Japanese population
- Once upon a time some Japanese people moved to the US. When their next generation were screened for Ca. stomach, its incidence was almost similar to the people in the US. Therefore, it could be concluded that the prevalence of Ca. stomach in people of Japan was due to environmental factors.
- **Migration study is done to know the role of environmental or cultural factors.**

Person Distribution:

- **Variations in the distribution of disease_ in age, sex, occupation and other subgroups of the population can be the starting point for an epidemiological enquiry leading to formulation of an etiological hypothesis for further study. Knowledge of the frequency of disease in subgroups of the population has also generated the concept of "high risk groups"**

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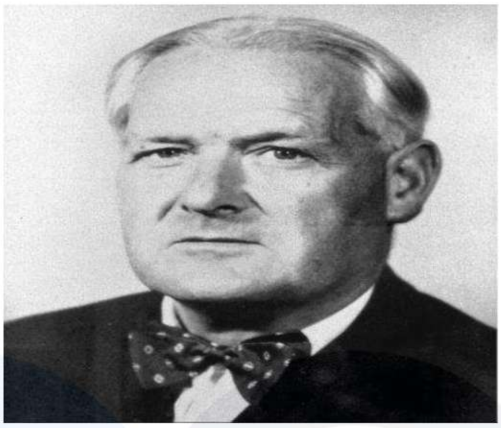
DETERMINANTS OR RISK FACTOR STUDIES

- Most of the diseases have multiple causes



Sir Austin Bradford Hill Fig: 1

"Hills criteria" of causal Association 00:02:00

- The risk factor that satisfies maximum number of Hill's criteria is the most important risk factor.

- The 9 criteria of Hill are:

1. Temporal association - suspected cause precede the observed effect. risk factor → outcome/disease (**Most important of Hill's criteria**)
2. Strength of association - it is given by Relative Risk (RR) and Odds Ratio (OR) and identify dose-response, duration-response relationship
3. Specificity - one to one relation between cause and effect. (Weakest hills criteria)
4. Consistency - similar/Replicable-association is consistent if the results are replicated when studied in different settings and by different methods

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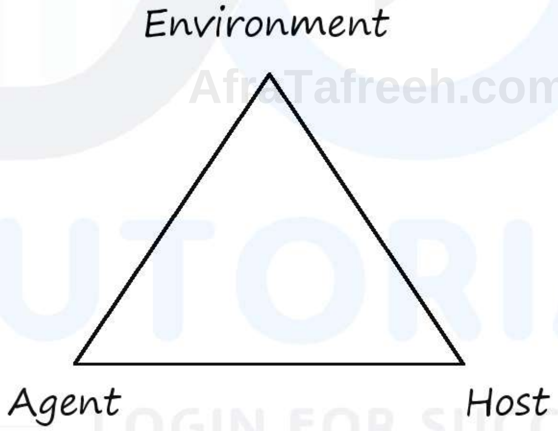
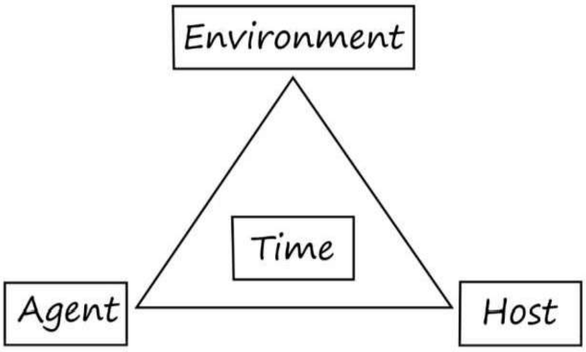
5. Study design- more powerful the study design, stronger the evidence
6. Coherence- logical connection
7. Biological plausibility- biological explanation showing connection between risk factor and outcome
8. Dose-response relationship- more risk factor more the chance of disease
9. Cessation of exposure- reversibility -once you stop smoking the no. of cases should reduce

Epidemiological Triad 00:11:00



- Interaction between the agent, host and the environment is necessary for any disease to occur lately, time period for the interaction is also an important factor.

Triangle of epidemiology 00:12:00


Environment
Time
Agent
Host

- So, the 4th important factor for disease causation is time.

Advanced model of triangle of epidemiology. 00:13:00

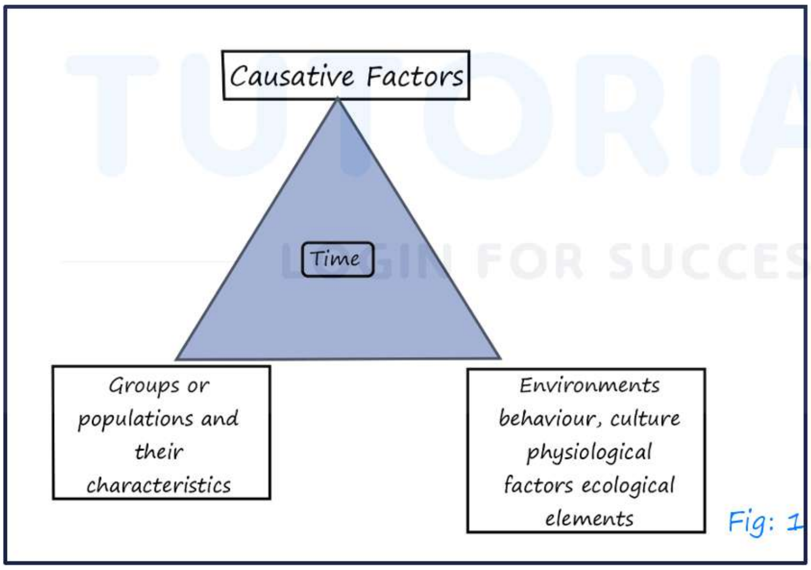

Causative Factors
Time
Groups or populations and their characteristics
Environments behaviour, culture physiological factors ecological elements

Fig: 1

- Agent → causative factors
- Host → groups or populations and their characteristics.

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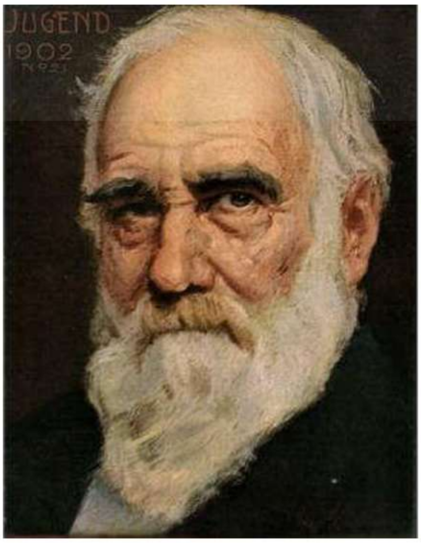
- Environment → behavior, culture physiological factors and ecological elements

Beings model: 00:15:00

- It contains 9 risk factors
  1. **B**iological risk factor
  2. **B**ehavioral risk factors
  3. **E**nvironmental risk factors
  4. **I**mmunological risk factors
  5. **N**utritional risk factors
  6. **G**enetic risk factors
  7. **S**ocial risk factors
  8. **S**ervice risk factors
  9. **S**piritual risk factors

Model of Multifactorial Causation 00:17:24

- The model was suggested by Pettenkofer

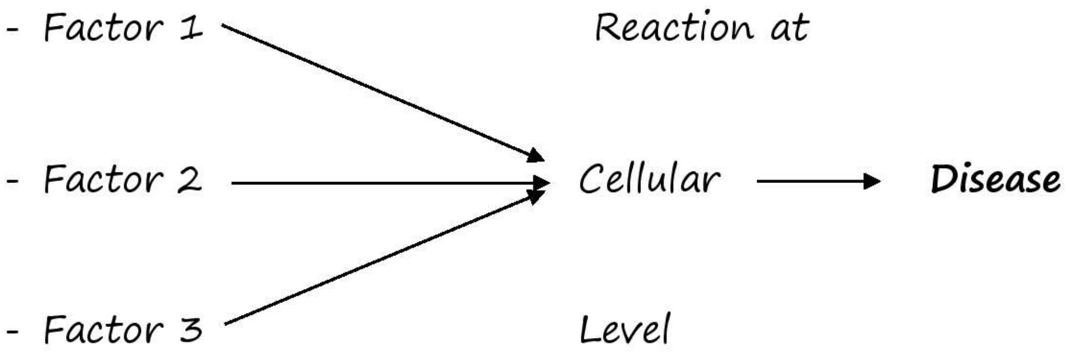


Pettenkofer

Fig: 3

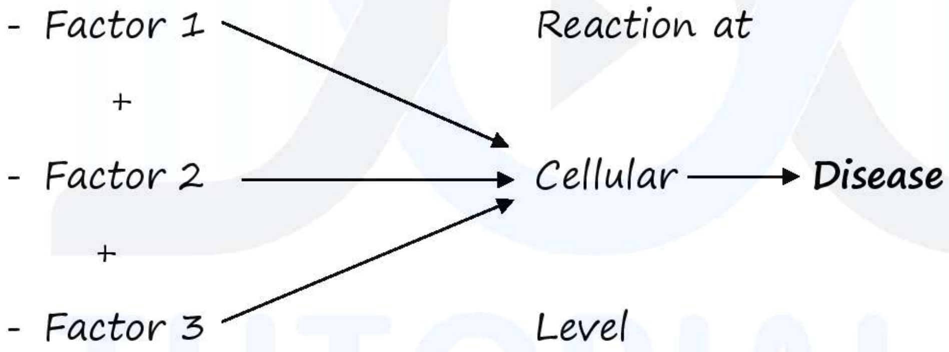
IBQ

Model of multifactorial causation


- Factor 1
- Factor 2
- Factor 3
Reaction at
Cellular
Level
Disease

- Multiple factors act at a cellular level leading to disease.

Model of multifactorial causation with synergism.

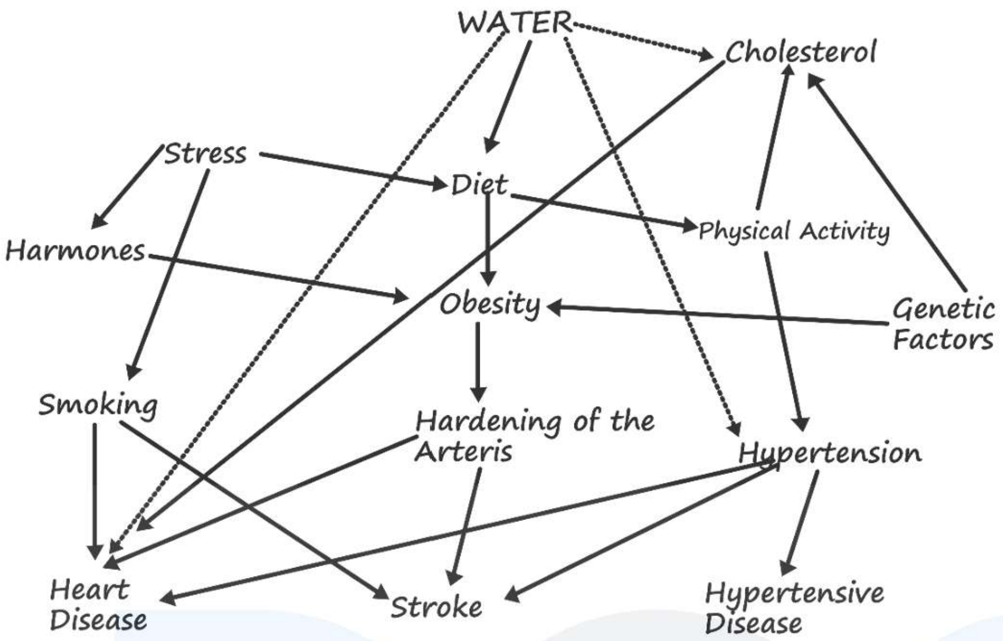

- Factor 1
+
- Factor 2
+
- Factor 3
Reaction at
Cellular
Level
Disease

Web of causation 00:19:00

- Web of causation was suggested by **Brian Mac Mahon** and **Thomas Pugh**

Uses of web of causation:

- All the risk factors are linked like a web
- Hence, merely by targeting the most vulnerable risk factor, all the other risk factors are targeted as well.


WATER
Cholesterol
Stress
Diet
Harmones
Physical Activity
Obesity
Genetic Factors
Smoking
Hardening of the Arteris
Hypertension
Heart Disease
Stroke
Hypertensive Disease

- Web of causation of cardio vascular disease

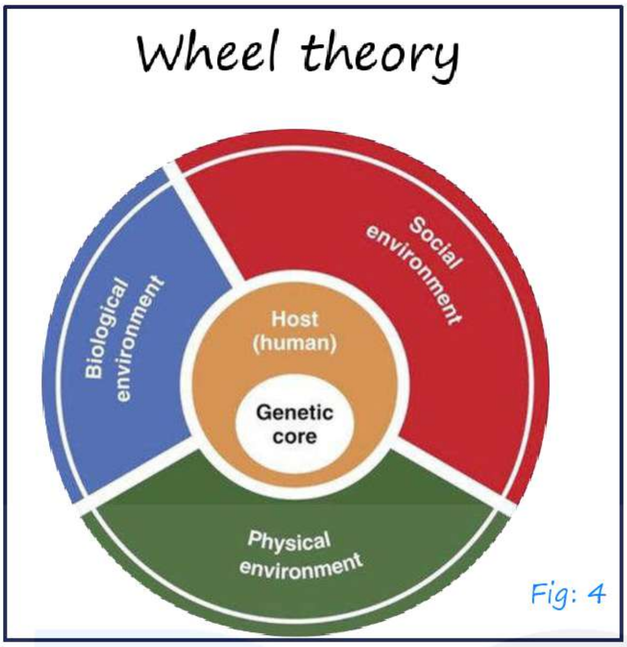
Wheel theory: 00:22:00

- The risk factors in this theory are arranged in the form of 2 rims one is an inner rim and the other is an outer rim.
- The inner rim has all the **genetic or internal factors**.
- While the outer rim represents the **environmental factors.**
- Environmental factors are divided into 3 different segments

  i. Social factors

  ii. Physical factors

  iii. Biological factors

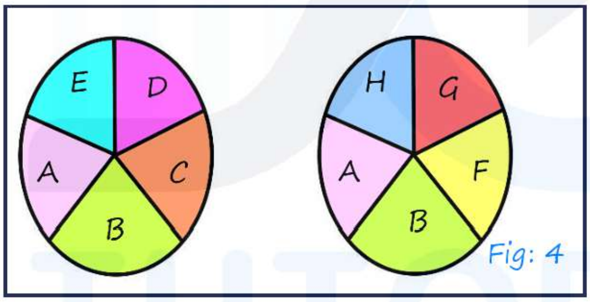


Wheel theory

Social environment
Biological environment
Host (human)
Genetic core
Physical environment

Fig: 4

Causal Pie model 00:24:00



E
D
A
C
B
H
G
A
F
B

Fig: 4

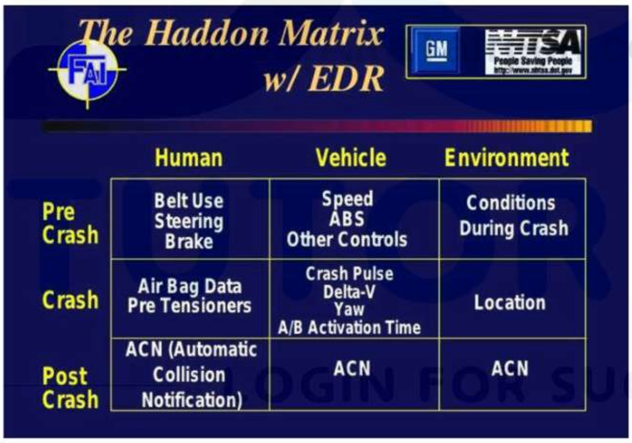
- Each piece of the pie is known as a component.
- So, it is also known as '**component cause model'.**

- 2 types of risk factors are present:
  i. Necessary risk factors (without this risk factor, disease will not occur)
  ii. Sufficient risk factors (this risk factor alone is sufficient for the disease to occur)

- The 4 causal relations are:
  i. Necessary and sufficient (now obsolete)
  ii. Necessary and/but not sufficient (e.g. TB bacilli is necessary but not sufficient for disease to occur)
  iii. Sufficient but not necessary (e.g. cigarette smoking and lung cancer)
  iv. Not sufficient and not necessary (e.g. air pollution and lung cancer)

Haddon Matrix

- This is a model which explains or analyses the risk factors in RTA and sports accidents/injuries.



The Haddon Matrix w/ EDR

	Human	Vehicle	Environment
Pre Crash	Belt Use Steering Brake	Speed ABS Other Controls	Conditions During Crash
Crash	Air Bag Data Pre Tensioners	Crash Pulse Delta-V Yaw A/B Activation Time	Location
Post Crash	ACN (Automatic Collision Notification)	ACN	ACN

Fig: 5

It is divided into factors involved in:

i. Pre-crash
ii. Crash
iii. Post-crash

Each of these are again divided into:

i. Human factors

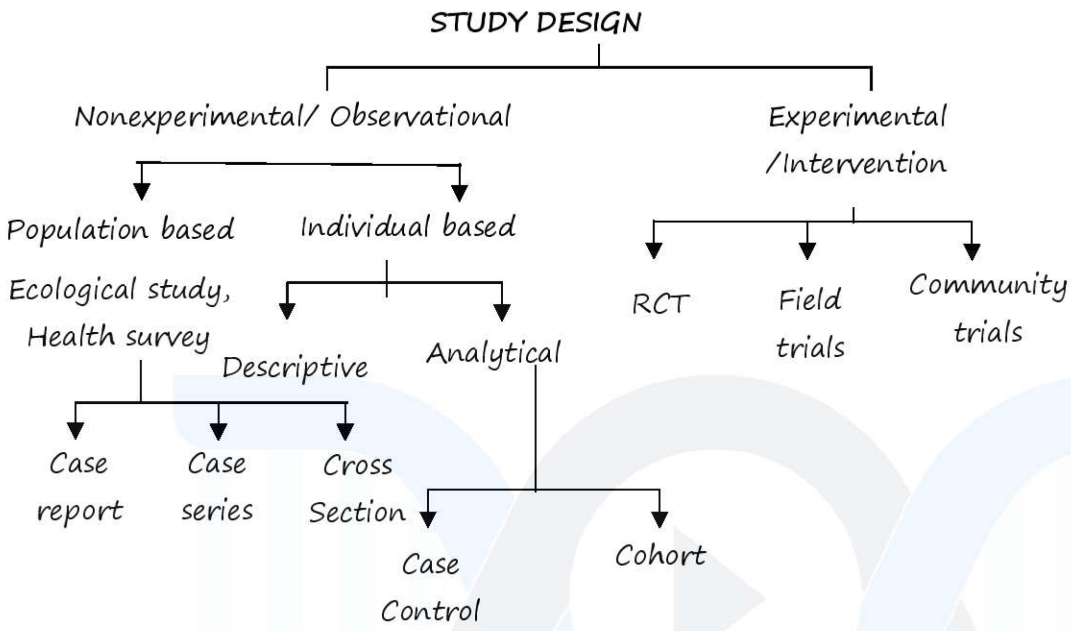
ii. Vehicle factors

iii. Environment factors

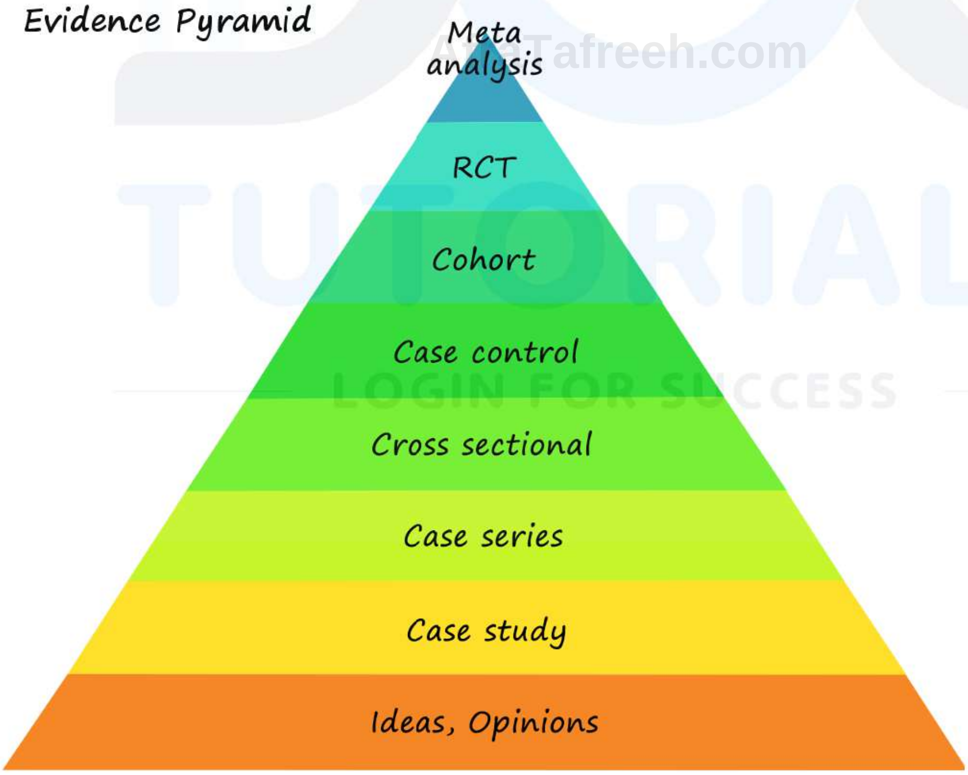
	Victim person	**Agent vehicle**	**Environment factors**
Pre-injury	Cycle training adult supervision	Reducing number and speed	Improved visibility around school entrances
Injury	Helmet use	Separating vehicles and cyclists	Enabling children to cycle on footpaths
Postinjury	Access to first aid	Vehicle redesign	Access to health services

INTRODUCTION TO STUDY DESIGN

Study design 00:00:06


STUDY DESIGN
Nonexperimental/ Observational
Experimental /Intervention
Population based
Individual based
Ecological study, Health survey
Descriptive
Analytical
Case report
Case series
Cross Section
Case Control
Cohort
RCT
Field trials
Community trials

Evidence Pyramid


Meta analysis
RCT
Cohort
Case control
Cross sectional
Case series
Case study
Ideas, Opinions

- This is known as evidence pyramid i.e. a pyramid in which various study designs are arranged in the form of a pyramid.

- As we climb up the pyramid the **strength of evidence** of the study design **increases.**
- **Meta-analysis is known as gold standard study design.**

Fig: 1

Father of Evidence Based Medicine-
David Lawrence Sackett

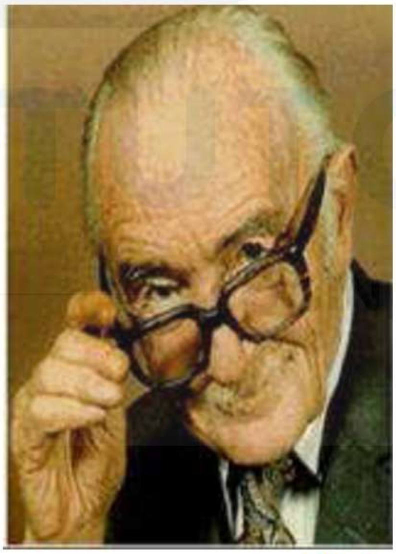


Fig: 2

Archie Cohrane

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STUDY DESIGN PART - I

- Analytical study designs, are divided into case control and cohort study
- The main goal is to:
  i. Identify whether the exposure is a real risk factor for the outcome.
  ii. Know how closely the exposure and outcome are associated.
- There is always a comparison group
- In case control, cases and controls are compared.
- In cohort exposed and non-exposed are compared.

Case control study design 00:01:25

- Also known as case-referent study
- In this, a group of people who have a disease (**Cases**)is compared to those who do not have the disease (**Controls**)
- There is **retrospective** assessment of **exposure in cases and controls.**
- This difference in exposure between cases and controls is the basis of case control studies.
- Example- 100 patients with Ca Lung are cases and 100 patients without Ca Lung are controls. Number of smokers is analyzed in both cases and controls. This

difference in the number of smokers in both groups is compared in case control.

- **Cornfield pointed out that, when the disease outcome of interest is rare, the odds ratio of exposure can be used to estimate the relative risk**

Cohort study design 00:05:00

- Also known as Follow up study
- Cohort is a group with similar exposure.
- A **group with exposure** and a **group without exposure** is taken and Both groups are **without disease**.
- There is **prospective** assessment of **development of disease.**
- Example - 100 smokers and 100 non-smokers are taken. Both groups are analyzed for a period of 10 years. The development of number of lung cancer patients in both groups is analyzed. The **difference in the outcome at the end of the follow of time is compared in cohort study.**
- Types of Cohort study:

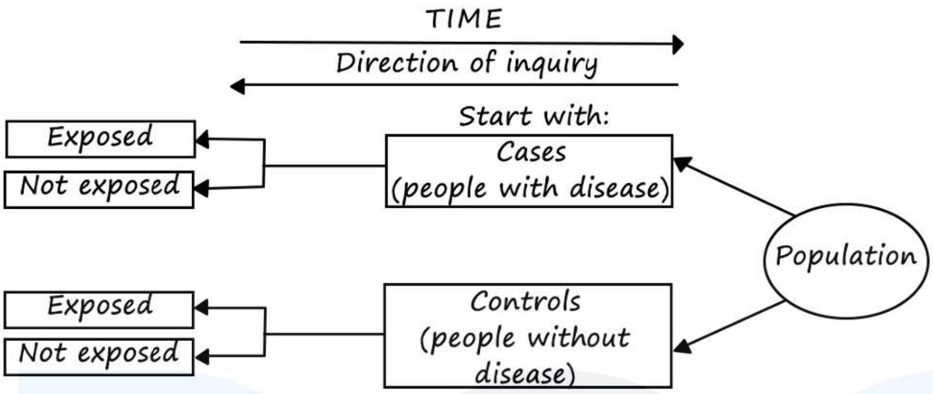
  1. Prospective cohort studies

  2. Retrospective cohort studies. and

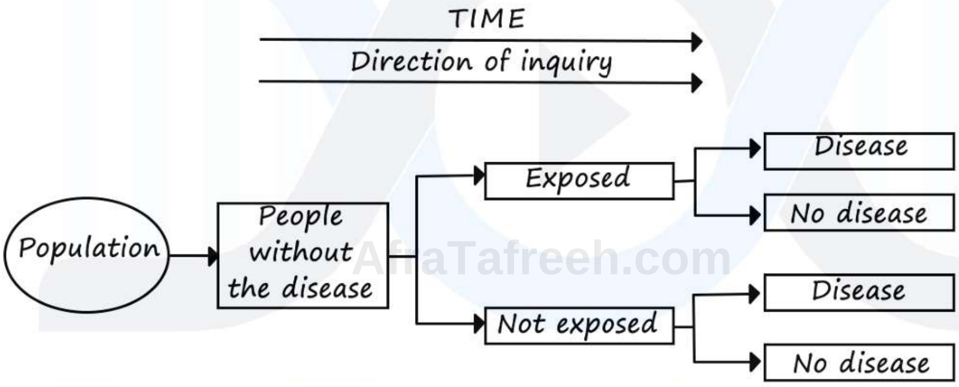
  **3. A combination of retrospective and prospective cohort
  studies.**

Estimation of risk done by RR (Relative risk), AR (Attributable Risk).

Design of a Case Control Study


TIME
Direction of inquiry
Start with:
Exposed
Not exposed
Cases
(people with disease)
Population
Exposed
Not exposed
Controls
(people without disease)

Design of a Cohort Study


TIME
Direction of inquiry
Population
People without the disease
Exposed
Not exposed
Disease
No disease
Disease
No disease

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Strength of association in case control

- It is done through **Odds Ratio.**
- It is a probability of exposure among cases and controls.
- A 2 X 2 table is taken:
  - In column →**Disease**
  - In row → **Exposure**
- Example: 100 cases and 100 controls of smoking is taken
  - Out of 100 cases- 60 smokers, 40 non-smokers

- Out of 100 controls- 20 were smokers, 80 non-smokers
- Odds ratio is known as **Cross Product Ratio.**
- Odds ratio for lung cancer - A X D / B X C - 60 X 80 / 20 X 40 = 6

Disease---	Yes	No
Exposed	60 A	20 B
Non-Exposed	40 C	80 D
Total-	**100**	**100**

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- Interpretation - $\frac{\text{Disease among exposed}}{\text{Disease among non-exposed}}$

- If odds ratio is –

  1. **More than 1** → Exposure is a risk factor for outcome
  2. **Equal to 1** → there is no association between risk factor and outcome
  3. **Less than 1** → exposure is a protective factor. Example - Vaccination

- Interpretation of odds ratio <1 → Example: 0.25= 25/100 → The given Factor gives **75% protection** against the causative agent

Relationship between odds and probability 00:20:00

- $\frac{\text{Chance of an event occurring}}{\text{Chance of the same event not occurring}}$

- Odds = $\frac{\text{Probability}}{1 - \text{Probability}}$

- Probability = $\frac{\text{Odds}}{1 + \text{Odds}}$

Matched case control 00:23:00

- There are two types of match-
  i. Pair matching or Individual matching
  ii. Group matching or Frequency matching
- Analysis of matched case control -
- Cases are written on one side and exposure is written on the other side and they are divided by exposed and non-exposed.
- Example: If there are 100 matched pairs of 100 cases and 100 Controls- Total 200.

- Out of 100 matched pairs, in 10 pairs - both were found to be exposed
    - 20 pairs - both were non exposed.
    - 40 pairs - cases were exposed and controls were non exposed.
    - 30 pairs - cases were not exposed and controls were exposed.

		CONTROLS	
		Exposed	**Not exposed**
CASES	**Exposed**	**10** A	**40** B
	Non-Exposed	**30** C	**20** D

- Concordant pairs- Pairs with similar exposure → A and D are concordant pairs.
- Discordant pairs- Pairs with dissimilar exposure → C and B are discordant pairs.
- Discordant pairs are more important and thus concordant pairs are removed.
- **Odds ratio of matched case control** = $\frac{B}{C}$

Nested case control 00:31:00

- **It is a case control study that is within a cohort study.**
- Example: Effects of smoking in females such as osteoporosis, early menopause.
- A group of smokers and nonsmokers are taken and studied for 15 years.
- After 5 years, we find that some women in both groups develop Carpel Tunnel Syndrome in those who are taking oral contraceptives.
- Those with carpel tunnel syndrome are cases and those without are controls. **Retrospective analysis** is done due to unintentional findings.
- Nested case control is a hybrid study design
- It is also called a variant of case control
- It is a case control nested within cohort study
- Advantages of nested case control are:
  i. Temporality is well established (risk factor followed by Outcome)
  ii. No recall bias
  iii. Easy and economical

Case cohort study

- Similar to nested case control
- Here cases and controls are drawn from within a prospective study. All cases who developed the outcome of interest during the follow-up are

selected and compared with a random sample of the cohort. This randomly selected control sample could, by chance, include some cases. Exposure is defined prior to disease development based on data collected at baseline

- However, in nested case control → **the cases and controls are matched in time.**
- In case cohort → **the cases and controls are not matched in time**

STUDY DESIGNS PART – II

Outcome measures in cohort study 00:00:06

1. Incidence (number of new cases)
2. Relative risk – (**gives strength of association in a cohort study**)
3. Attributable risk (AR)
4. Population AR

Example:

- 100 smokers $\xrightarrow{\text{10 years}}$ 10 developed Ca lung
- 100 non-smokers $\xrightarrow{\text{10 years}}$ 2 developed Ca lung

		Ca lung +	**Ca lung** –	
smoker	+	10 (A)	90 (B)	100
smoker	-	2 (C)	98 (D)	100

Incidence is a.k.a absolute risk

Incidence among smokers = $\frac{10}{100}$ **(A/A +B)**

Incidence among non-smokers = $\frac{2}{100}$ **(C/C + D)**

Relative risk a.k.a. **Risk ratio** = $\frac{\text{Incidence among exposed}}{\text{Incidence among non-exposed}}$

$$= \frac{10/100}{2/100}$$

$$= \frac{A/(A+B)}{C/(C+D)}$$

$$= 5$$

- Therefore, smokers are 5 times more at risk for cancer of lung than the non-smokers
- The larger the RR, the greater the "strength" of the association between the suspected factor and disease.
- Relative risk > 1 → Risk factor
- Relative risk = 1 → No association
- Relative risk < 1 → Protective factor
- **If for example RR = 0.2 → relative Risk is 20 out of 100 → i.e., 80% protective**

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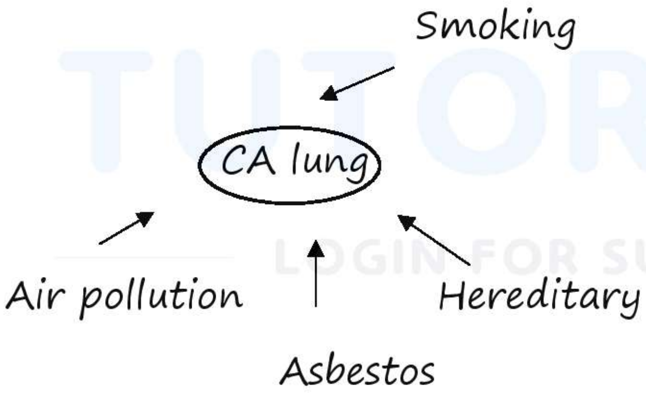
Relative risk reduction 00:09:24

- Relative risk reduction (RRR) or efficacy is the relative decrease in the risk of an adverse event in the exposed group compared to an unexposed group
- When RR is < 1
- RR reduction = $(1 - RR) \times 100$
  - E. g: If RR = 0.2
  - RRR = $(1 - 0.2) * 100 = 80\%$
- Interprets the percentage of protection given when population/ individual is **exposed to a risk factor**

Attributable risk 00:10:30

- Measures **percentage of risk that is attributable to each risk factor** (risk attributed by single risk factor)



- Formula ➔ $$\frac{\text{Incidence among the exposed} - \text{Incidence among the non-exposed} \times 100}{\text{Incidence among the exposed}}$$

$$= \frac{10 - 2 \times 100}{10} = 80\%$$

- Background risk → Incidence of risk factors among non-smokers
- Incidence of Ca lung among smokers = Risk due to smoking + Background risk
- Interpretation- 80 % lung Ca among smokers (exposed) is attributed to smoking alone

Population attributable risk (PAR) 00:17:00

- PAR- Incidence of the disease (or death) in the total population
- minus the incidence of disease (or death) among those who
- were not exposed to the suspected causal factor

$$\frac{\text{Incidence among population} - \text{Incidence among NE}}{\text{Incidence among population}}$$

- For e. g.: PAR = 50%, this means that 50% lung Ca cases could be avoided if the risk factor of cigarettes smoking were eliminated.

Levin's formula for calculating PAR

$$\text{PAR} = \frac{\text{Pe (RR} - 1)}{\text{Pe (RR} - 1) + 1} \times 100\%$$

- Where Pe = Proportion of exposed

  RR = Relative risk

Types of cohorts 00:21:00

- **Prospective** (current or noncurrent) cohort study
- **Retrospective** (historic or noncurrent) cohort study
- **Combined prospective – Retrospective** (mixed or am bidirectional) cohort study

STUDY DESIGN PART-III

Cross Sectional Study 00:00:11

- Simplest form of an observational study, also known as "prevalence study"
- More useful for chronic than short-lived diseases.
- It is a single examination of a cross section of a population. Example: survey
- **It is like taking a snap shot of a population**
- Disadvantage- It is **neither retrospective** (case control) **nor prospective** (cohort) type of study.
- The time sequence which is essential to the concept of causativity cannot be deduced from cross-sectional data.
- very little information about the natural history of disease or about the rate of occurrence of new cases (incidence).
- Advantage- Everything about a disease that is studied while it is happening can be explained.

ECOLOGICAL STUDY DESIGN

- **An observational study defined by the level at which data are analysed, namely at the population or group level, rather than individual level**
- **Unit of study → population**
- Outcome → **average of population**
- **Correlation of variables** is found in ecological study design.
- Advantages: Simple and easy
- Disadvantage: Causality cannot be established, prone to bias and confounding
- Types of ecological studies
  - Geographical
  - Longitudinal
  - Migration

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Ecological Fallacy 00:03:25

- An **error** that is encountered while performing an ecological study is called as ecological fallacy.
- Occurs when relationships which exist for groups are assumed to also be true for individuals
- Example: If it is found that the no. of females who smoke are increasing and simultaneously, the number of lung cancer cases in females are also increasing, the

conclusion that lung cancers occur in females due to smoking is made.

- An ecological study is an average of the population. It does not work when it is attributed it to each and every person in population, this is known as ecological fallacy.
- When group data is used to draw conclusions about an individual.

Exception fallacy 00:05:00

- It is the opposite of ecological fallacy which means we are **trying to take an individual value and generalise it to the entire population.**
- Example: if an SPM professor is rude or mean in class and students assume all SPM faculty are rude or mean in class. This is exception fallacy.
- Data from an individual is *extrapolated* or *generalised* to everyone in population this is exception fallacy.

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RANDOMISED CONTROL TRIAL

History of clinical trial 00:01:05

- 1st clinical trial was done by **James Lind**
- He was a Scottish Naval Doctor

Randomised control trials :

- **Steps of Conducting RCT:**

  1 . Drawing up a protocol.

  2. Selecting reference and experimental populations.

  3. Randomization.

  4. Manipulation or intervention.

  5. Follow-up.

  6. Assessment of outcome.

- Example – a group of 100 patients

  - Divided into 2 equal groups at **Random**

50 patients (as known as treatment arm)	**50 patients (Control arm)**
↑	↑
New drugs of choice is given	Placebo is given

Follow both groups to see what percentage of patients get cured

↓

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Result

↓

Compare the cure mate as
the result of a RCT

Randomisation

- Procedure by which it's decided on its own which individual goes to treatment/ control arm
- The researcher doesn't choose who goes where

- Randomisation is known as "**Heart of RCT**" as it removes biases like
  - Selection bias
  - Confounder bias
  - Two arms become comparable with respect to prognostic factors

Selection bias 00:07:20

- Error/bias committed while selecting patients into treatment and control arm

Confounder bias 00:10:00

A systematic distortion in the measure of association between exposure and the health outcome caused by mixing the effect of the exposure of primary interest with extraneous risk factors

When outcome to an exposure is being studied

↓

Confounder is the third external factor that

shows some relationship in the exposure

&

Is an independent risk factor for the outcome

How to remove confounder

- Design stage
  - a. Randomization
  - b. Matching
  - c. Restriction
- Analysis stage
  - a. Standardisation
  - b. Matched analysis
  - c. Stratified analysis
  - d. Multivariate analysis

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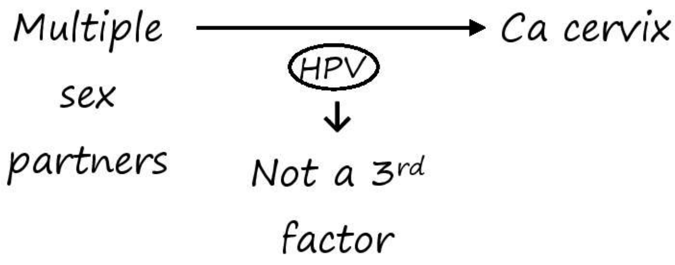
Terms confused with confounder 00:18:50

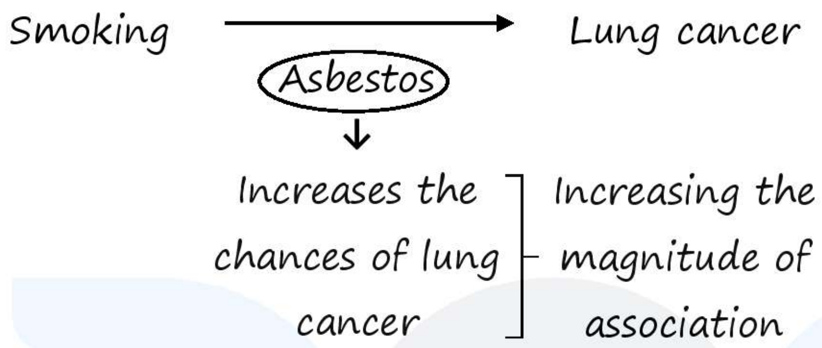
Mediator

- Factor coming in the pathway between exposure and outcome
- Example: -



Effect modifier – It is associated with the outcome but not the exposure.

- Changes the magnitude of associated between exposure & outcome



Smoking → Lung cancer

Asbestos

↓

Increases the chances of lung cancer – Increasing the magnitude of association

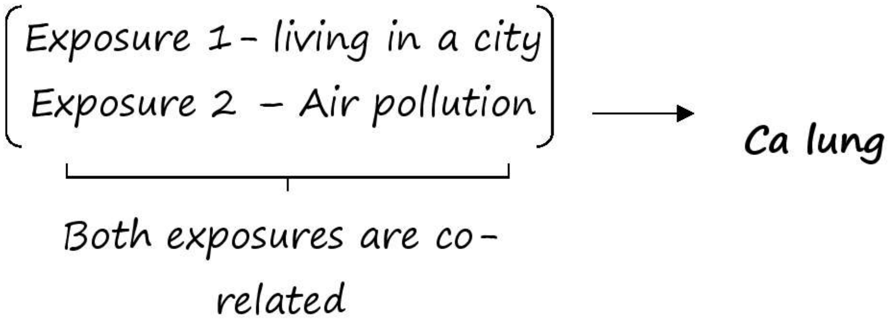
Thus confounding factor is associated with both the exposure and the outcome but does not lie on the causative pathway.

Collinearity

> 1 exposure → **Outcome**

(exposure are co-related)

- Example:



Exposure 1 – living in a city

Exposure 2 – Air pollution

→ **Ca lung**

Both exposures are co-related

Blinding 00:26:02

- As known as **Masking**
- To avoid bias by not knowing who belong to the treatment and control arm
- These biases are avoided at: -
  - Subject bias – if the subject knows if he is getting treatment/ placebo
  - Investigation bias
  - Analyzer bias

Types of blinding

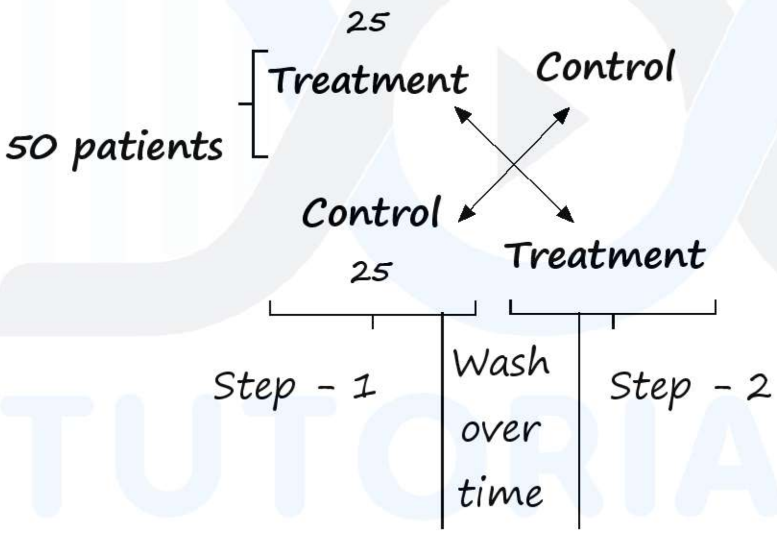
- Single blind – if the subject doesn't know about treatment/ control
- Double blind – if patient and investigator are blind
- Triple blind – subject, investigator & analyser are blinded
  - Best type of blinding – **Triple Blinding**
  - Most commonly used blinding – **Double Blinding**
  - Trial without blinding – **Open Trial**

Type of RCT 00:32:45

- Parallel RCT
- Cross over RCT
- Pre-post clinical trail
- Factorial design

MCQ's

- Cross over RCT – 2 steps
  - Parallel RCT : comparisons are made between two randomly assigned groups, one group exposed to specific treatment, and the other group not exposed. Patients remain in the study group or the control group for the duration of the investigation
  - Crossing over


25
Treatment
Control
50 patients
Control
Treatment
25
Step - 1
Wash
over
time
Step - 2

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Advantage of cross over RCT

- Can be done on a small group of subjects
- Can be used to conduct RCT on rare diseases
- Same patient act as control for themselves
- All subjects receive treatment at some point (either step 1 or 2)

Disadvantage of cross over RCT

- Wash over/ carry over time-time required to wait (t ½) of the drug before crossing over
- Not good if the drug cures the disease
- Natural course of disease can affect the outcome

In pre & post clinical trail

- Advantage: Same person acts as control to themselves
- Factorial design
  - Testing done with more than one drug in single trial
  - Drugs with different MOA and outcome can be compared

Phases of drug trial 00:47:05

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- In-vitro/ pre-clinical trials
- Phase 0
  - As known as micro dosing study
  - First human level trial
- Phase 1
  - Studying safety, non-toxicity profile and maximum dose needed
- Phase 2
  - Study the safety & efficacy of the drugs
- Phase 3

RCT

↓

In reality, placebo is not given to the control arm

↓

Treatment arm receives the new treatment

Control arm receives the best drug in the market

↓

If the new drug is better

↓

Goes to FDA for approval

↓

Market the drug if it gets approval

- Phase 4
  - Post marketing surveillance
  - **Longest phase**
- Phase 5
  - Translational research
  - The result of the trial should be translated for betterment of humans

Analysis in RCT 00:54:36

- Intention to treat analysis – Dropouts are included in final analysis

↓

Advantage: This would be the worst possible result

- Per protocol analysis – Dropouts are excluded

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- Efficacy of the drug

$$\text{Formula} = \frac{(\text{Rate of disease in control group}) - (\text{Rate of disease in treatment group})}{\text{Rate of disease in control group}}$$

$$= 1 - \frac{\text{Rate of disease in treatment group}}{\text{Rate of disease in control group}}$$

$$= \boxed{1 - \text{Relative Risk}}$$

- Number needed to treat (NNT) – Number Needed to Treat (NNT) is the number of patients you need to treat to prevent one additional bad outcome (death, stroke, etc.). For example, if a drug has an NNT of 5, it means you have to treat 5 people with the drug to prevent one additional bad outcome.

or

- Minimum number of patients to be given NEW treatment to get one **extra cure** compared to control arm

$$\boxed{\text{Lower the NNT} \rightarrow \text{Better the drug}}$$

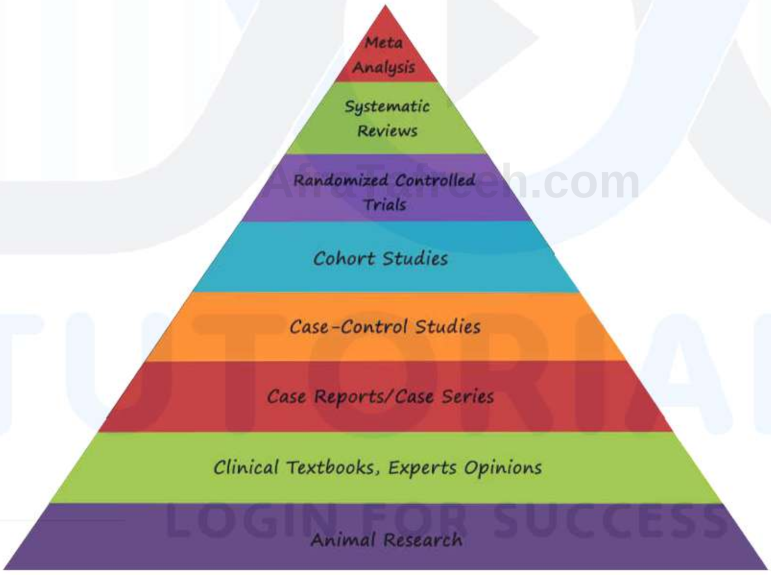
- Formula =

$$\frac{1}{(\text{Incidence of disease in control group}) - (\text{Incidence of disease in treatment groups})}$$

$$\boxed{\text{NNT} = \frac{1}{\text{Absolute risk reduction}}}$$

META-ANALYSIS

- A systematic review attempts to gather all available empirical research by using clearly defined, systematic methods to obtain answers to a specific question.
- A meta-analysis is the statistical process of analyzing and combining results from several similar studies.
- In simple way - Systematically combining the results of previous research.
- Meta-analysis is known as **gold standard study design**.


Meta Analysis
Systematic Reviews
Randomized Controlled Trials
Cohort Studies
Case-Control Studies
Case Reports/Case Series
Clinical Textbooks, Experts Opinions
Animal Research

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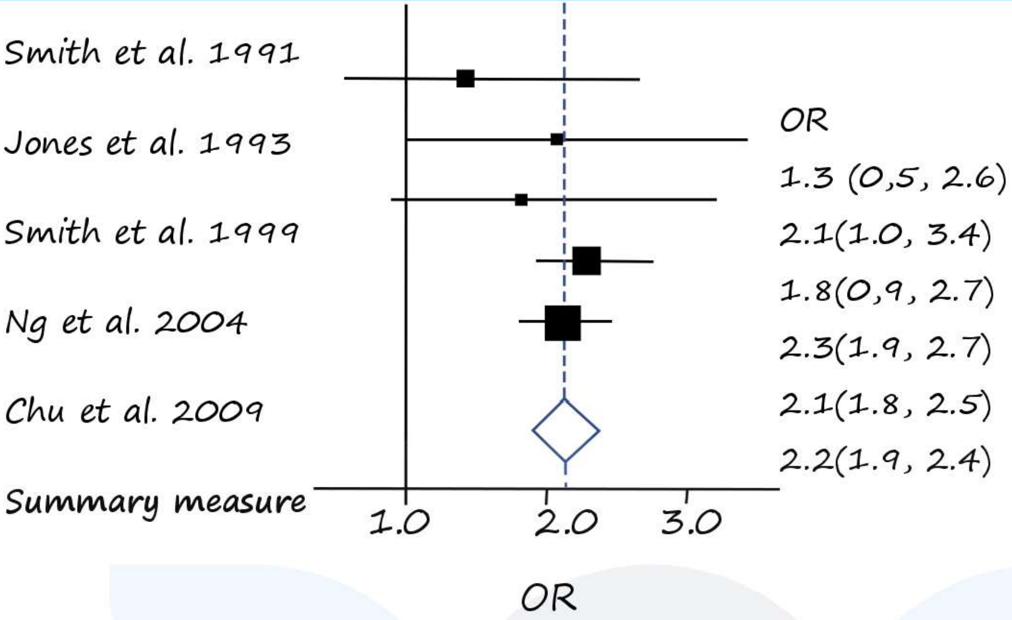
- Meta analysis is the highest evolved study design and is placed top most on the evidence pyramid.
- In systemic review, the studies are described and not their statistical analysis.
- Whereas, in meta-analysis statistical analysis is done.

Results in meta-analysis 00:03:05



- The above is a meta-analysis combining the results of Odds ratio of 5 studies.
- Towards the left the names of individual studies are taken.
- In the middle along the X axis the values of odds ratio are taken.
- Individual results are depicted in the form of a **square.**
- And summary measures are depicted in the form of a **diamond.**
- The tails represent **95% confidence interval** of Odds Ratio.
- It is known as **Forest Plot** and **Blobbogram.**

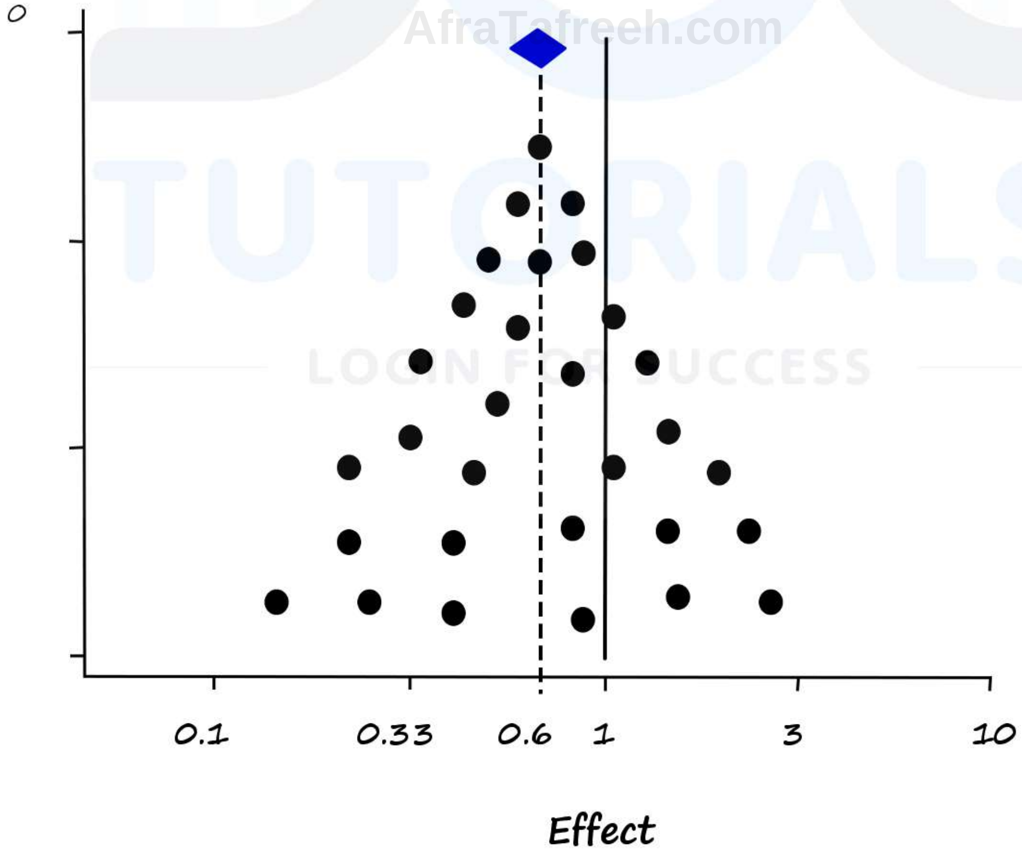
Drawbacks 00:08:38

i. **GIGO**- garbage in garbage out

ii. **Apple and oranges effect** (same outside i.e., round, different inside)

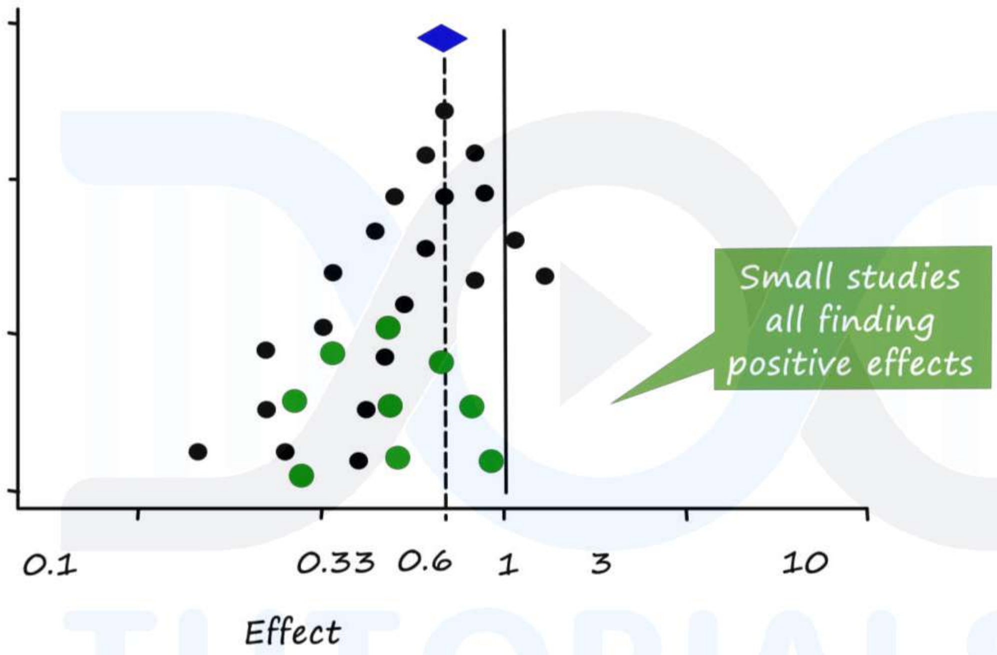
iii. **Publication bias**/File drawer effect (error we come across when we collect only published studies which gives only positively skewed results)

- Publication bias is checked using funnel plot
- 1st summary result is plotted.
- Then we plot the individual results from various studies → if a symmetrical funnel shape is obtained, there is no publication bias.



- The funnel shape means that the individual studies are almost equally distributed on both sides of the summary measure. (Almost Equal number of positive and negative results)

Asymmetrical funnel plot 00:11:45



- Majority of the individual studies are concentrated towards left side only. Which could mean there is a publication bias.

HISTORY OF PUBLIC HEALTH & IMAGE BASED QUESTIONS

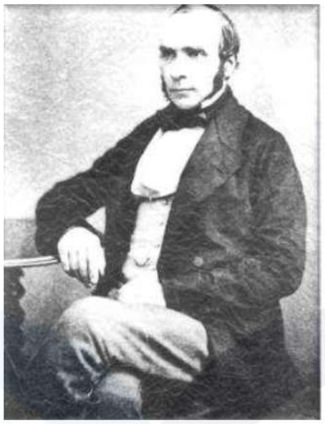


Fig: 1

Father of epidemiology – John snow

- First Doctor who calculated doses for use of ether & chloroform as surgical anesthesia.

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Ether apparatus

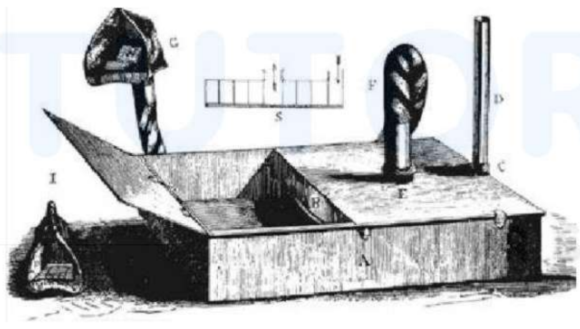

Fig: 2

Father of modern medicine – Hippocrates

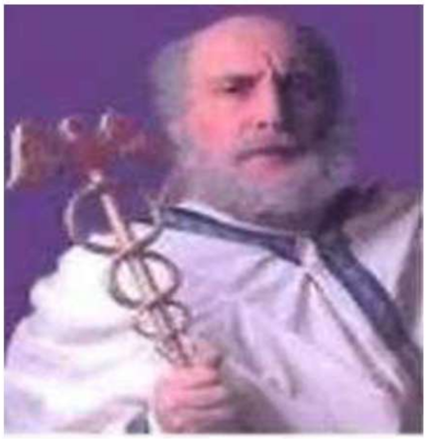

Fig: 3

Father of Indian medicine – Charaka

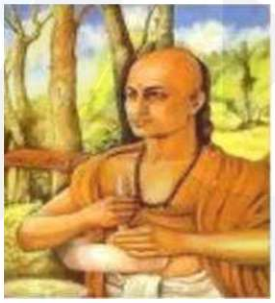

Fig: 4

Father of modern surgery – Ambroise pare

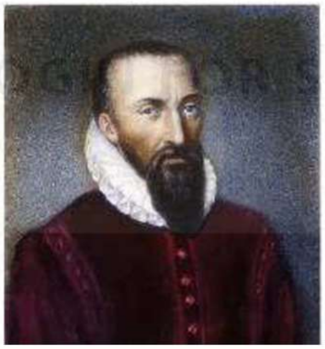

Fig: 5

Father of Indian surgery – susrutha

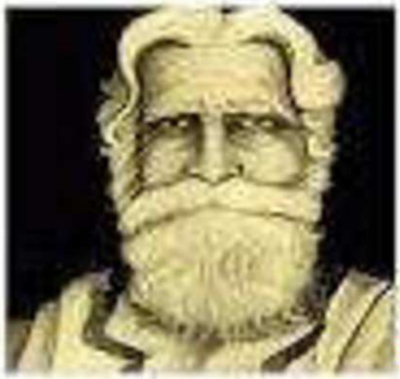

Fig: 6

Father of microbiology – Louis Pasteur

Fig: 7

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Father of antisepsis – Joseph Lister

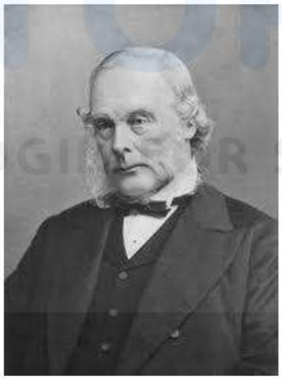

Fig: 8

Fig: 9

Father of gynecology – James Marion Sims

Father of medicine – William Osler

Fig: 10

Osler's sign → pretibial myxedema, pseudo hypertension

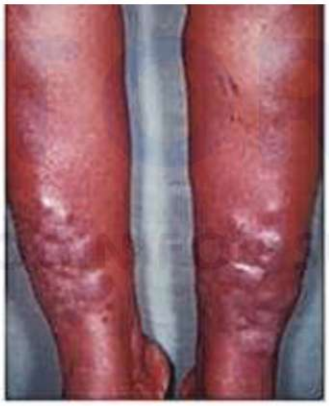

Fig: 11

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Osler's nodes → painful nodules in infections endocarditis

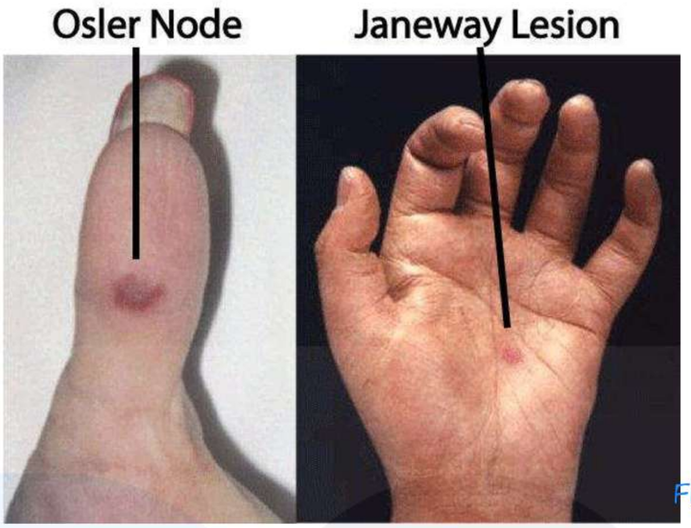

Fig: 12

- Osler's–Weber–Rendu disease → hereditary hemorrhagic telangiectasia (HHT).
- Osler's–Vasquez disease → polycythemia rubra Vera.

TUTORIALS
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Father of radiology → W.C roentgen

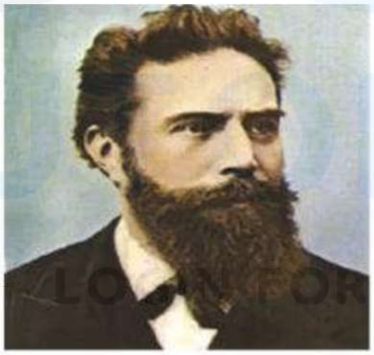


Fig: 13

Father of pathology → Rudolf Virchow

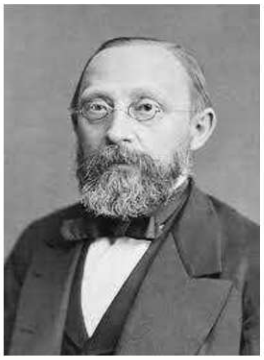


Fig: 14

Very first x ray (Anonymous ray)

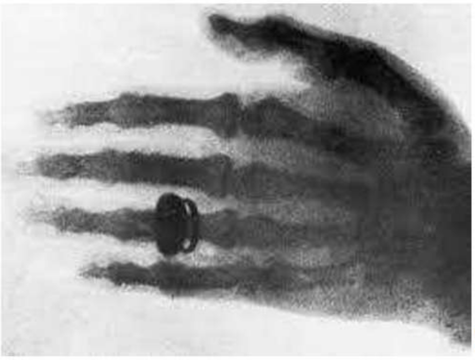


Fig: 15

- Virchow's node → supraclavicular node.
- Virchow's triad →

  i. Venus stasis.

  ii. Hypercoagulability.

  iii. Endothelial injury.
- Virchow Robin spaces → perivascular spaces in the brain that surround the perforating vessels.
- Virchow – seckel syndrome → micro cephalic primordial dwarfism.

Father of physiology → Claude Bernard.

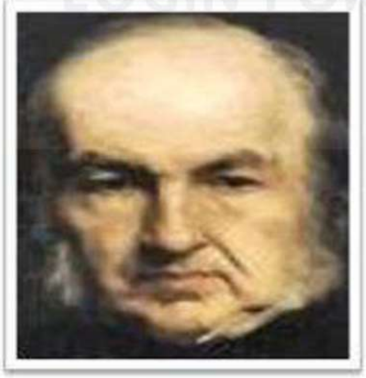


Fig: 16

Father of homeopathy → Samuel Hahnemann.

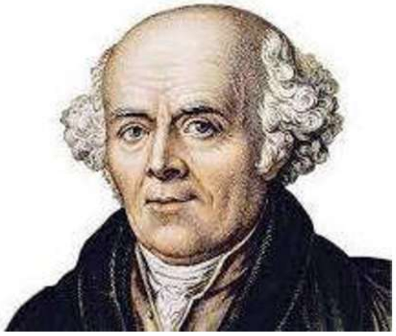
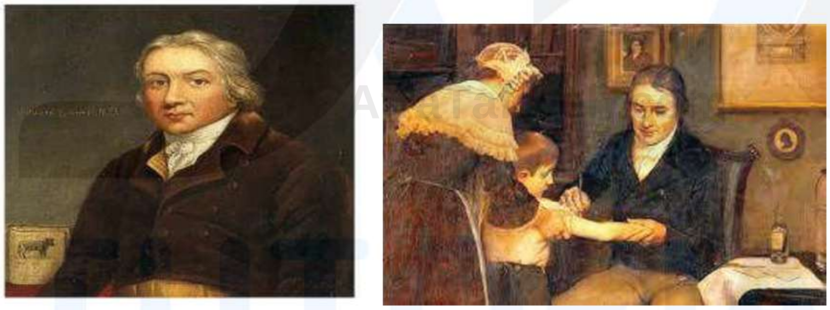


Fig: 17

- Father of biology – Aristotle.
- Father of modern Anatomy – Vesalius.
- Father of psychoanalysis – Sigmund Freud.
- Father of genetics– Gregor Mendel



Edward Jenner– Introduced Small Pox Vaccine

Fig: 18

i. Discovered First vaccine → cowpox vaccine which later was used for Small Pox

ii. Introduced the term vaccine

iii. First and only disease eradicated is Small Pox

iv. Eradicated → small pox.

Louis Pasteur

Fig: 17

- Introduced –

  i. Germ theory of disease.

  ii. Technique of sterilization.

  iii. Technique of pasteurization.

- Introduced **anthrax & rabies vaccine** for humans.
- Introduced ***fowl cholera vaccine.***

TUTORIALS
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Karl Landsteiner

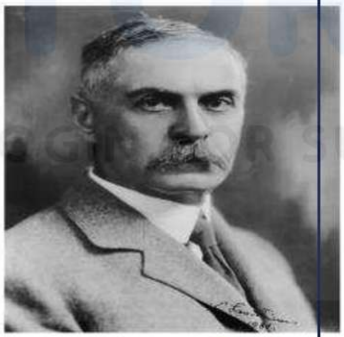

Fig: 18

- He gave the description of the human ABO blood group system, and laid the foundation for the modern medical practice of blood transfusion

Ronald Ross → described the lifecycle of malaria.

Fig: 19

Alexandra Flemings → discovered penicillin.

Fig: 20

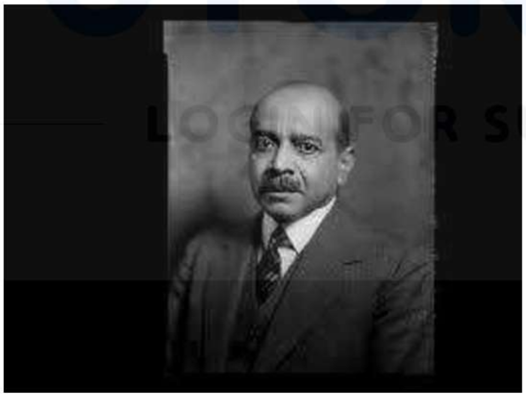

Fig: 21

Joseph bhore → introduced primary health care in India.

TUTORIALS
LOOK FOR SUCCESS

IMPORTANT MCQs

- Slim's disease → HIV/AIDS
- Black sickness → kala azar

- Black Death → plague.
- Break bone fever → dengue
- Monkey fever → KFD
- 5-day fever → trench fever.
- 8th day fever → tetanus neonatorum
- 100-day cough → pertussis
- Cerebrospinal fever → meningococcal meningitis.
- Hansen's disease → leprosy.
- First disease- Rubeola, Measles, Hard measles, 14-day measles, moribilli
- Second disease-Scarlet Fever, Scarlatina
- Third disease-Rubella, German measles, 3-day measles
- Fourth disease-Filatow-Dukes' Disease, Staphylococcal Scalded Skin Syndrome, Ritter's disease
- Fifth disease-Erythema infectiosum
- Sixth disease-Exanthem subitum, Roseola infantum, "Sudden Rash", rose rash of infants, 3-day fever
- Seventh

TUTORIALS LOGIN FOR SUCCESS

IMAGE BASED QUESTIONS

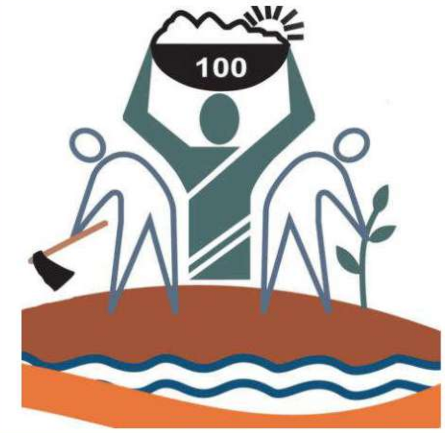

Fig: 1

MGNREGS (Mahatma Gandhi National Rural Employment Guarantee Scheme)

- 100 days of Guaranteed work from a Below the poverty line (BPL) family for >18yrs person

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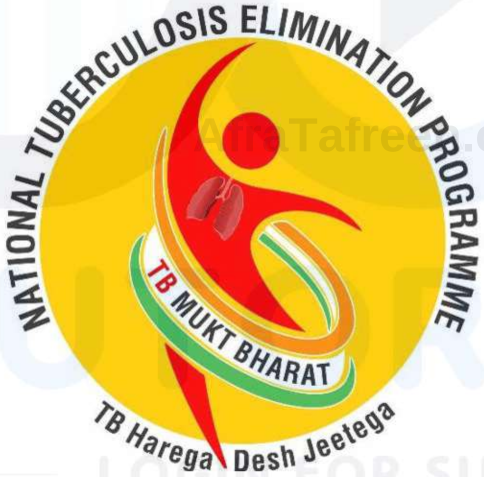
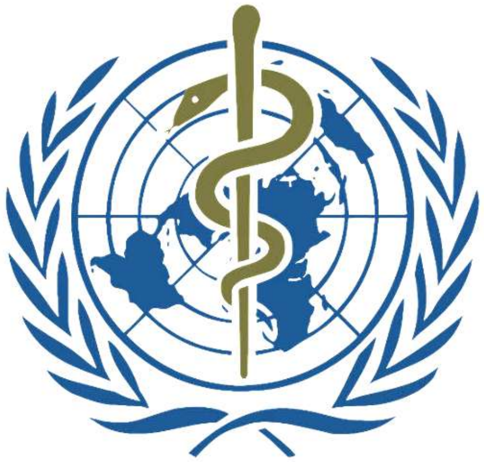

NATIONAL TUBERCULOSIS ELIMINATION PROGRAMME
TB MUKT BHARAT
TB Harega Desh Jeetega

Fig: 2

NTEP → National Tuberculosis Elimination Program



Logo of WHO Fig: 3

- The WHO emblem consists of the United Nations symbol **surmounted by a staff with a snake coiling round it.**
- Most of the time confused with medical logo with 2 snakes coiling around staff/rod with wings.

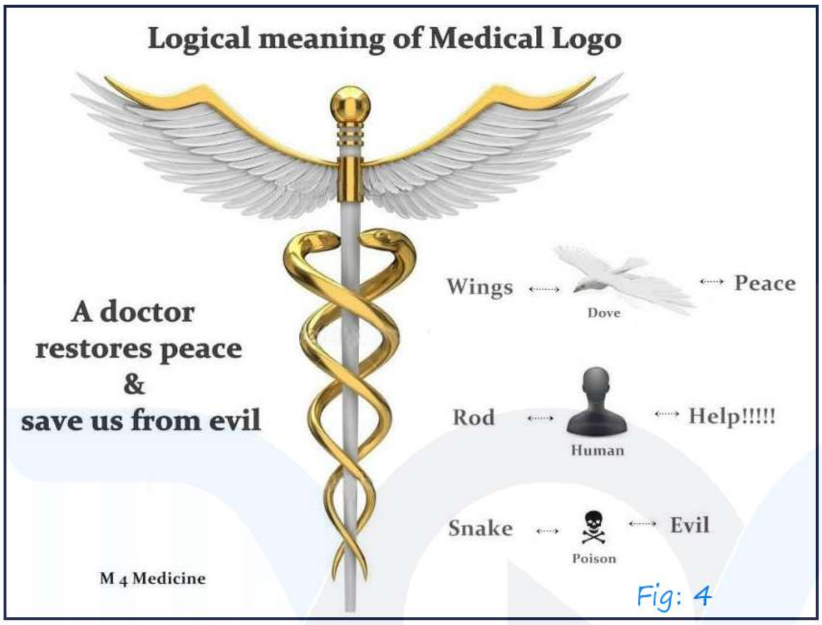
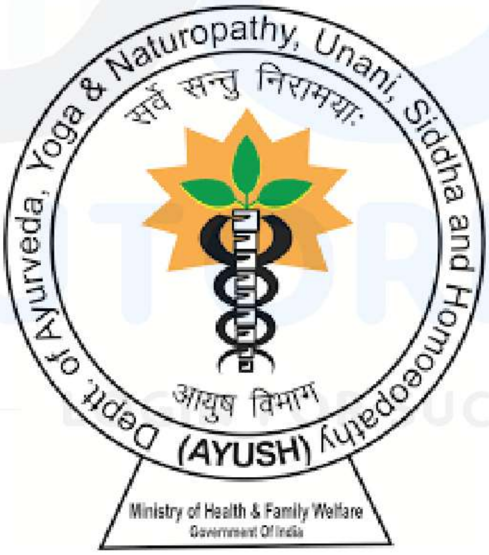

Logical meaning of Medical Logo
A doctor restores peace & save us from evil
Wings
Dove
Peace
Rod
Human
Help!!!!!
Snake
Poison
Evil
M 4 Medicine

Fig: 4


Dept. of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy
सर्वे सन्तु निरामयाः
आयुष विभाग
(AYUSH)
Ministry of Health & Family Welfare
Government Of India

Logo of AYUSH (Ayurveda Yoga & Naturopathy Unani Siddha Homeopathy) Fig: 5

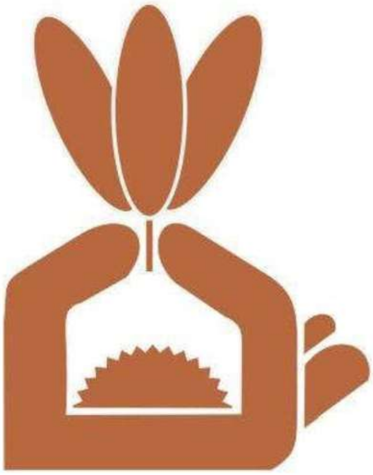
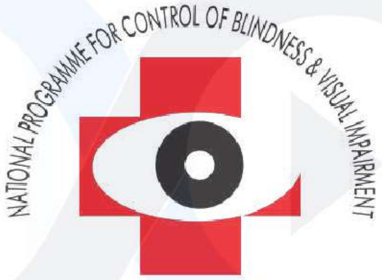


Fig: 6

Logo of National leprosy eradication programmer (NLEP)


NATIONAL PROGRAMME FOR CONTROL OF BLINDNESS & VISUAL IMPAIRMENT

Logo of Blindness control programme

(Now called → National Programme for control of blindness & visual impairment)

Fig: 7

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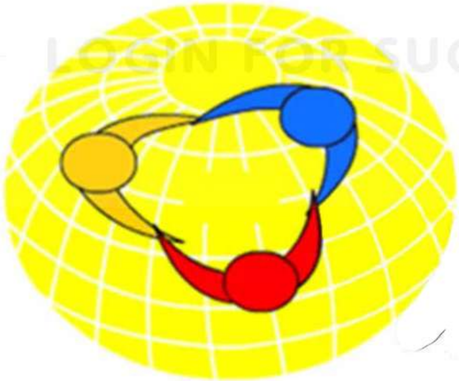


Fig: 8

Integrated Disease surveillance program

Helps to identify disease outbreaks at the earliest and present it

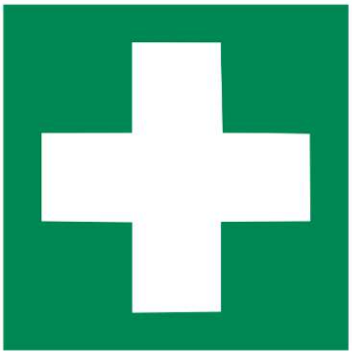
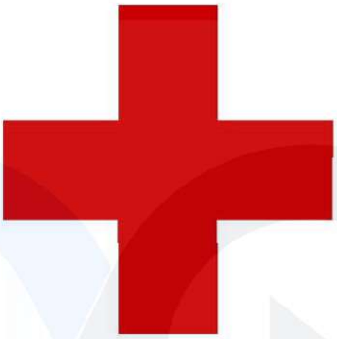


Fig: 9

White cross inside a green square → First aid



Red cross logo Fig: 10

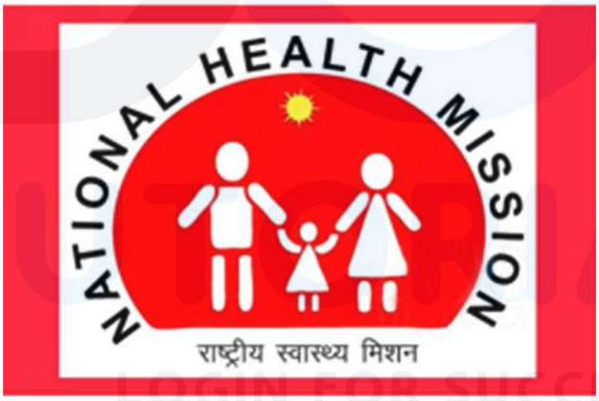

NATIONAL HEALTH MISSION
राष्ट्रीय स्वास्थ्य मिशन

Fig: 11

Logo of National health mission

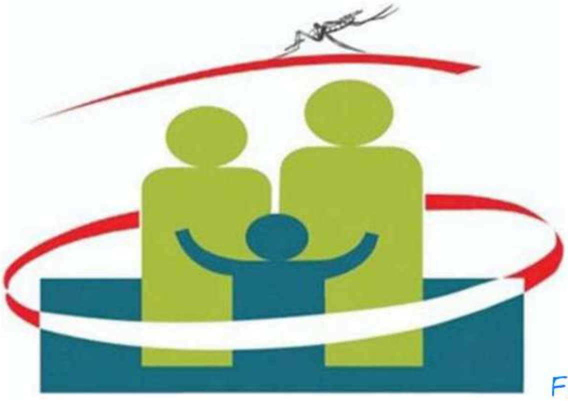


Fig: 12

National Vector borne disease control programme (NVBDCP)

Includes 6 vector borne disease -malaria, filaria, dengue, chikungunya, Japanese encephalitis and Kala-azar

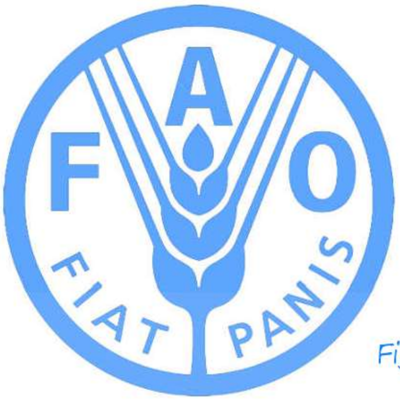


Fig: 13

Food and Agricultural Organization (FAO)

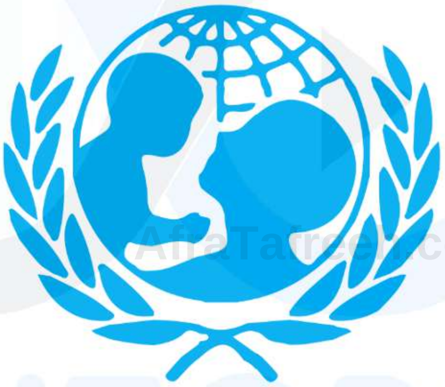


Fig: 14

Logo of UNICEF (united national children's fund)

(Earlier known as → United nations international children's emergency fund)

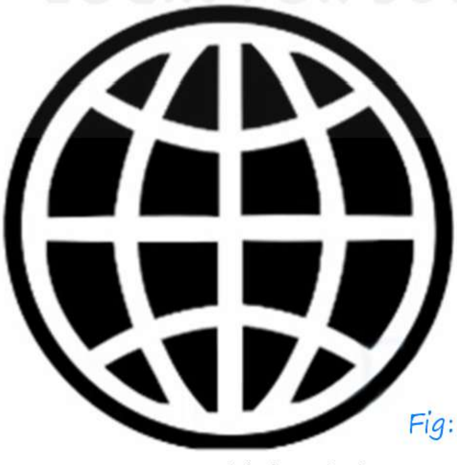


Fig: 15

World bank logo

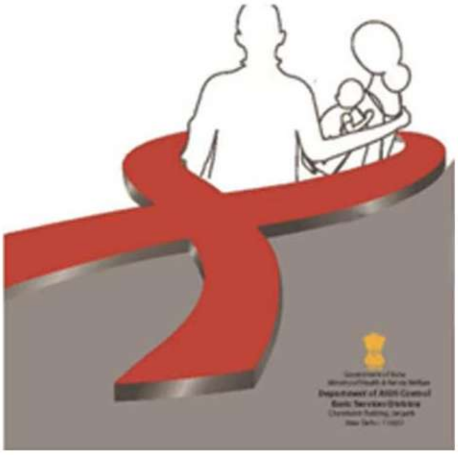


Fig: 16

Logo of Prevention of Parent to Child transmission of HIV (PPTCT)

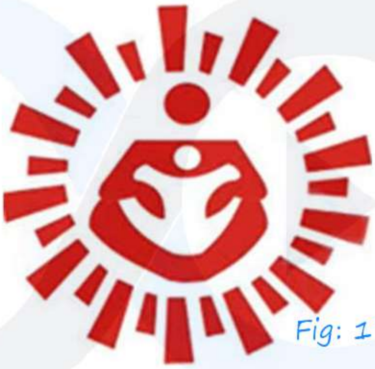


Fig: 17

Logo of ICDS (Integrated child development services)

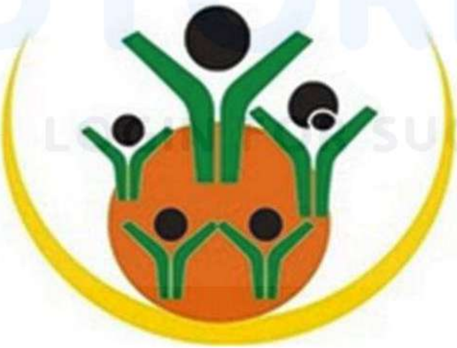


Fig: 18

Logo of Rastriya swastya bhima yojna (RSBY)

Insurance for a family of 5 by government

Premium of Rs 30 for insurance coverage of Rs 30,000 for a family of 5

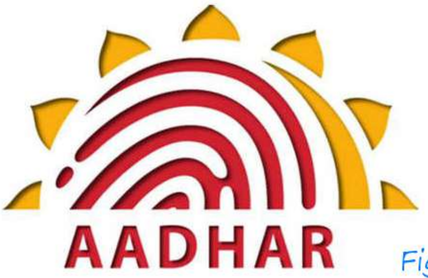
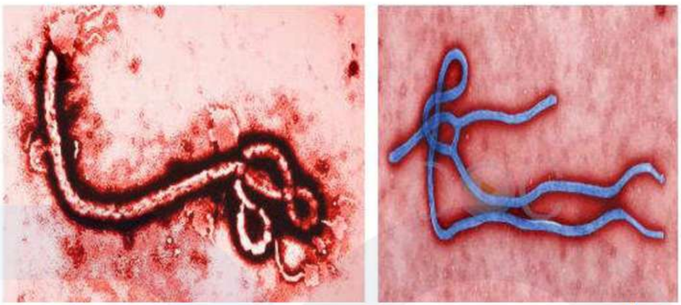


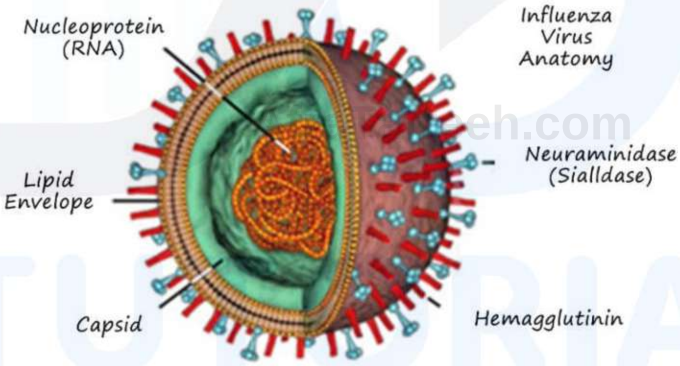
Fig: 19

AADHAAR logo



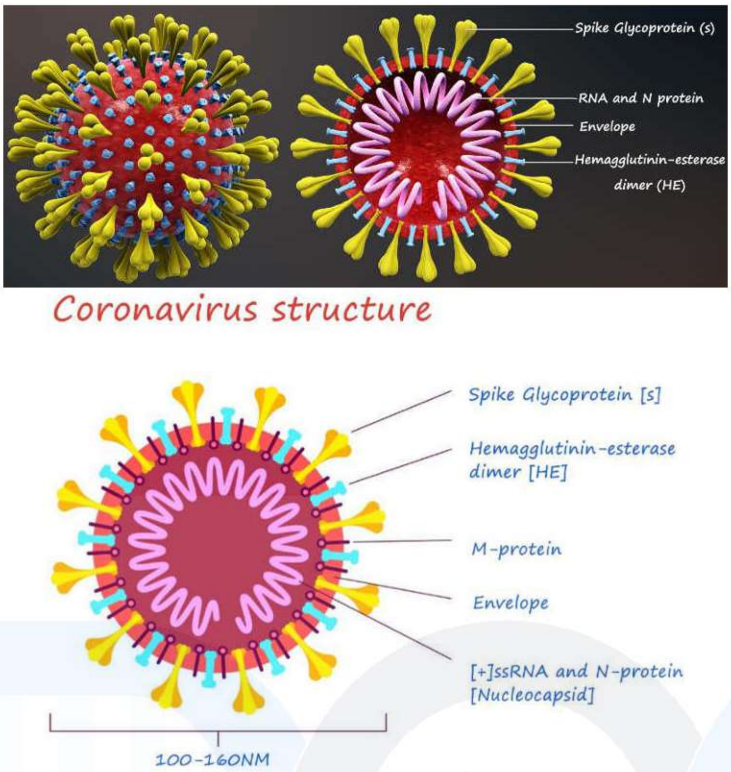
Ebola virus

Fig: 20


Nucleoprotein (RNA)
Influenza Virus Anatomy
Lipid Envelope
Neuraminidase (Sialldase)
Capsid
Hemagglutinin

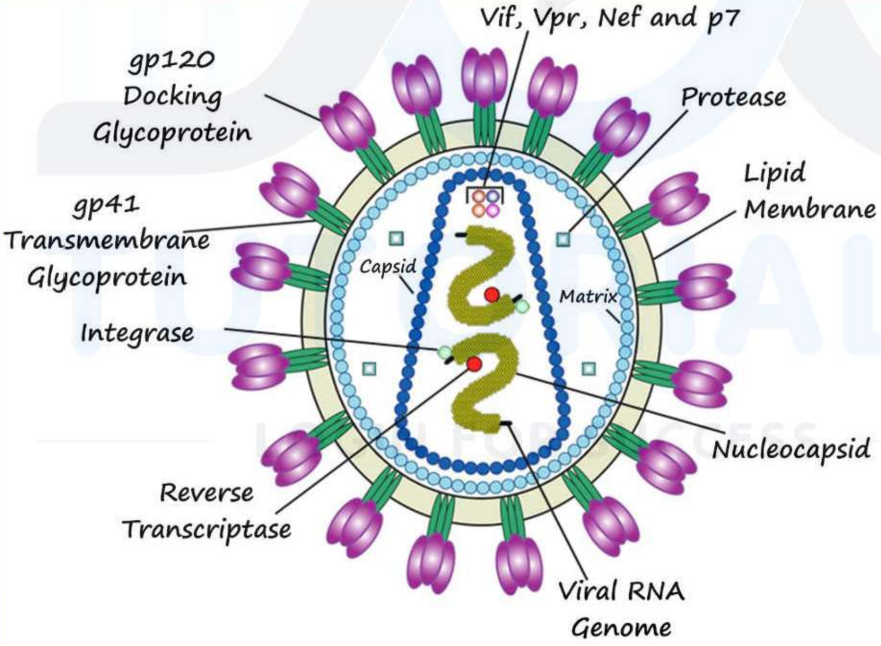
Influenza virus

Fig: 21


Spike Glycoprotein (s)
RNA and N protein
Envelope
Hemagglutinin-esterase dimer (HE)
Coronavirus structure
Spike Glycoprotein [s]
Hemagglutinin-esterase dimer [HE]
M-protein
Envelope
[+]ssRNA and N-protein [Nucleocapsid]
100-160NM

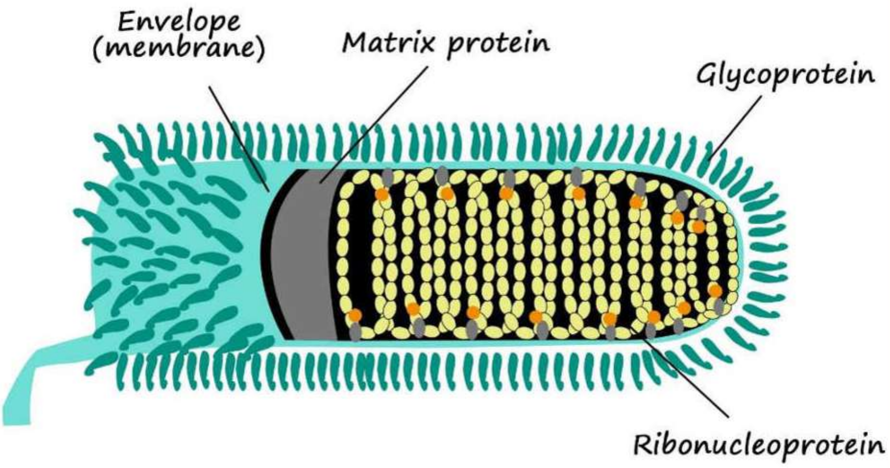
Corona virus

Fig: 22


Vif, Vpr, Nef and p7
gp120 Docking Glycoprotein
Protease
Lipid Membrane
gp41 Transmembrane Glycoprotein
Capsid
Matrix
Integrase
Nucleocapsid
Reverse Transcriptase
Viral RNA Genome

HIV virus

Fig: 23


Envelope (membrane)
Matrix protein
Glycoprotein
Ribonucleoprotein

Rabies virus (Bullet shaped) Fig: 24

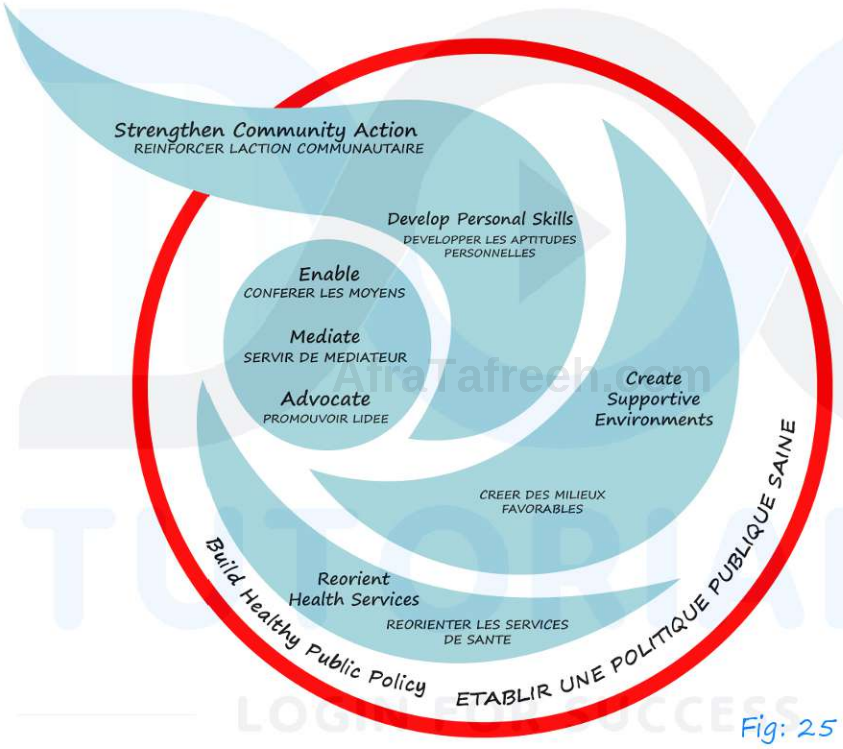

Strengthen Community Action
REINFORCER LACTION COMMUNAUTAIRE
Develop Personal Skills
DEVELOPPER LES APTITUDES PERSONNELLES
Enable
CONFERER LES MOYENS
Mediate
SERVIR DE MEDIATEUR
Advocate
PROMOUVOIR LIDEE
Create Supportive Environments
CREER DES MILIEUX FAVORABLES
Reorient Health Services
REORIENTER LES SERVICES DE SANTE
Build Healthy Public Policy
ETABLIR UNE POLITIQUE PUBLIQUE SAINE

Fig: 25

Ottawa charter emblem for health promotion

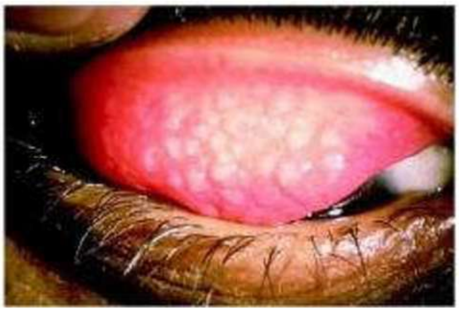


Fig: 26

Conjunctival lesions (tarsal)

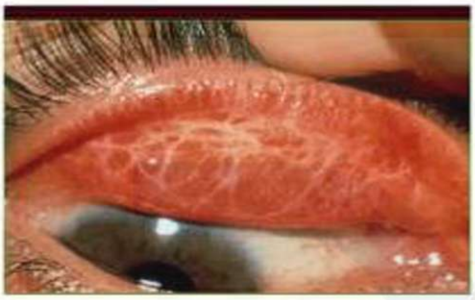
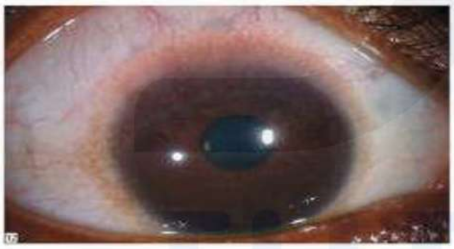


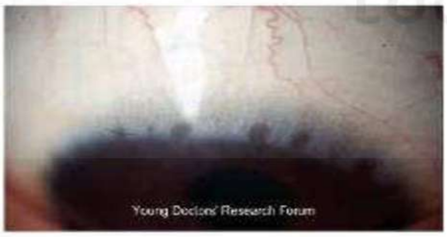
Fig: 27

Conjunctival Scarring



Panus

Fig: 28


Young Doctors' Research Forum

Herbert's pits

Fig: 29

Seen in
Trachoma

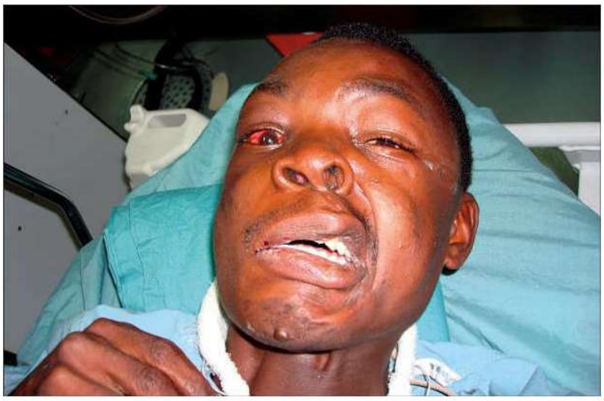


Fig: 30

Lock jaw (trismus) → Tetanus

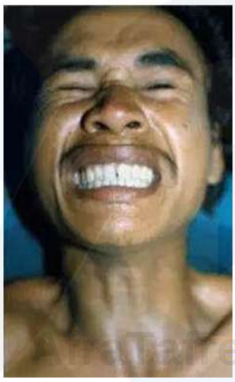
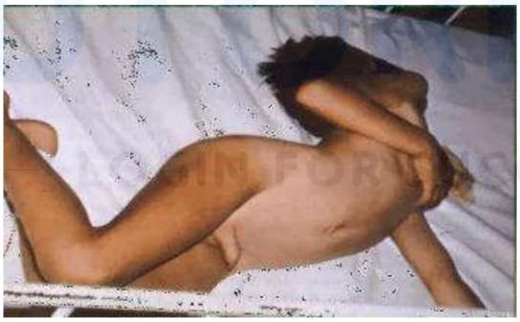


Fig: 31

Rises sardonicus- Tetanus



Opisthotonos → Tetanus

Fig: 32

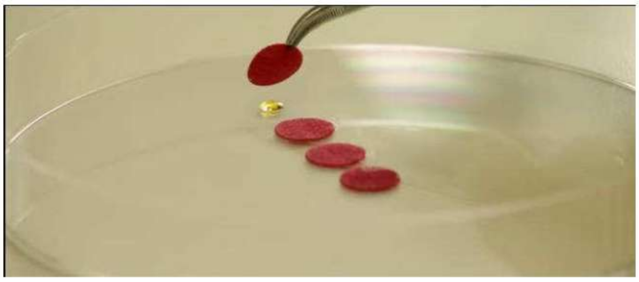


Fig: 33

Fortification of Bindi is with iodine drops → Jeevan Bindi

- To Prevent iodine deficiency in **Tribal women**
- **8hrs of Jeevan Bindi** → **Reaches RDA of iodine**

LIFE SAVING DOT
जीवन बिंदी

Fig: 34

Jeevan Bindi called as lifesaving dot

SENSITIVITY, SPECIFICITY, PREDICTIVE VALUES

Screening and diagnostic tests

- Diagnostic test is done on those with indication or who all are sick.
- Screening is the search for unrecognized disease or defect by means of
- rapidly applied tests, examinations, or other procedures in apparently healthy individuals.

- The objective of a screening test is that it should be able to correctly pick all those who have the disease and simultaneously rule out all those who do not have the disease.
- e.g. Let's consider 100 TB patients and 100 normal (no TB) ones.
- Now, Mantoux is done for 100 TB patients but, due to various reasons a few number of TB positive can show negative Mantoux

	TB POSITIVE	TB NEGATIVE
MANTOUX +	80 A (TRUE POSITIVE)	10 B (FALSE POSITIVE)
MANTOUX –	20 C (FALSE NEGATIVE)	90 D (TRUE NEGATIVE)
	TOTAL 100	TOTAL 100

- Then, Mantoux is done for 100 normal patients but all will not show negative Mantoux due to various reasons A few of these normal patients will show positive Mantoux.

Sensitivity	Specificity
Ability of test to identify those with the disease from diseased population, i.e., True Positives	Ability of a test to correctly detect all those who do not have the disease among the non-diseased population, i.e True Negatives
A/(A + C) = TP/(TP+FN)	D/(B + D) = TN/(TN+FP)
80/100 = 80%	90/100= 90%

Positive predictive value (PPV) 00:11:17

- As the name indicates, it means how true are the positive values predicted by your test
- In the above example, Mantoux has predicted 90 to be positive which includes true positive as well as false positive.
- out of these, how many are actual positives is PPV.

- Formula:
  - True positive / (true positive + false positive) = A/(A + B)

DOC TUTORIALS LOGIN FOR SUCCESS

- PPV Definition: probability for a person with positive result to actually have the disease.

Negative predictive value (NPV) 00:14:00

- Out of those who were negative how good are values predicted by your test.
- Formula
  - True negatives/ (true negative +false negative) = D/ (C + D)
  - NPV is therefore the probability of a person with negative result to actually not have the disease.

Application:

- High Sensitivity of the test picks as many cases with the disease as possible.
- Specificity confirms the existence of a disease. (It is usually applied as **secondary or confirmatory test** on those who were tested positive during the initial test)
- Test with high sensitivity: it will pick as many diseased as possible (true positive as well as false positives). Specificity is applied later for confirmation.
- Specificity excludes the negatives and those that are remaining are the positives (with disease).
- So, application of sensitivity is for screening.
- Application of specificity is for confirmation

- Sensitivity> for screening
- Specificity> for confirmation

- Mnemonic -
  - **SN-N-OUT** → If a test is **SeN**sitive – and it says **N**egative – Rule **OUT** the disease
  - **SP-P-IN** → If a test is **SP**ecific – and it says **P**ositive – Rule **IN** the disease (It is confirmed)
- PPV for - Elisa -70%
- **Predictive accuracy** → it gives the diagnostic power of the test.

  The more prevalent a disease is in a given population, the more accurate will be the predictive value of a positive screening test.

  The predictive value of a positive result falls as disease prevalence declines.
- **Yield of a test** → number of previously unrecognized diseases detected by your screening test.

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Baye's Theorem 00:34:00

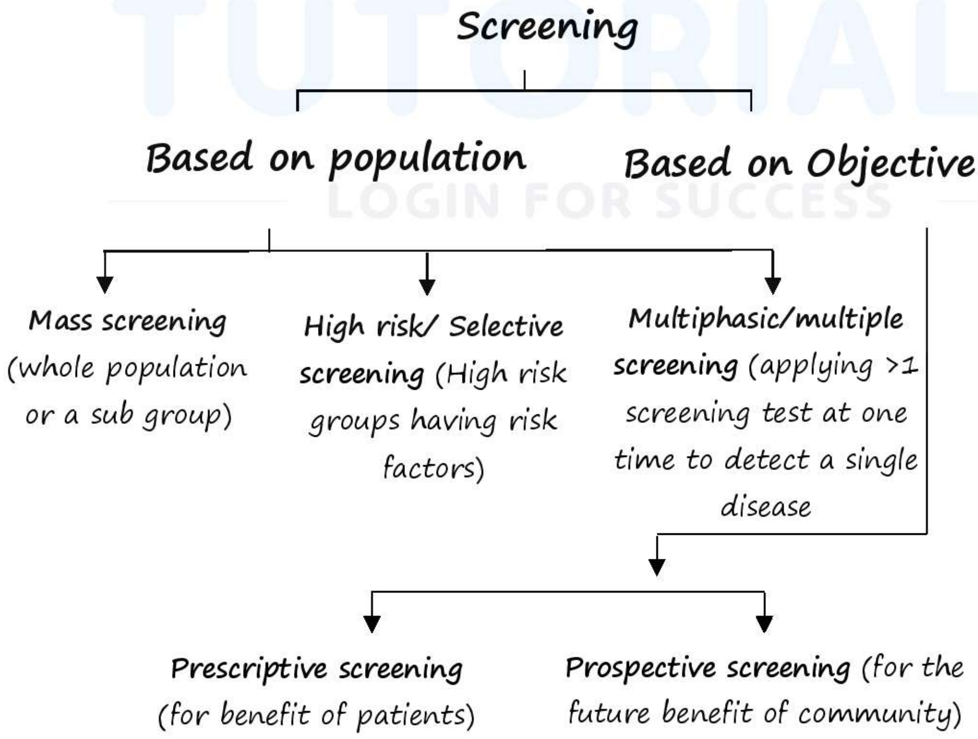
$$PPV = \frac{\text{Sensitivity} \times \text{Prevalence}}{(\text{Sensitivity} \times \text{Prevalence}) + (1-\text{specificity})(1-\text{Prevalence})} \times 100$$

$$NPV = \frac{\text{Specificity} \times (1-\text{Prevalence})}{\{\text{Specificity} \times (1-\text{Prevalence})\} + \{(1-\text{sensitivity}) \times \text{Prevalence}\}} \times 100$$

TYPES OF SCREENING

Prescriptive	Prospective
People are screened for own benefit	People are screened for others benefit/ For the community
Case detection in patient	Disease control in the community
No specific request is required	Specific request from authority is required
Eg: Neonatal screening, cancer screening, Urine for sugar	Eg: Screening for immigrants, HIV screening in sex workers, screening of blood donors

DOC TUTORIALS
LOGIN FOR SUCCESS


Screening
Based on population
Based on Objective
Mass screening (whole population or a sub group)
High risk/ Selective screening (High risk groups having risk factors)
Multiphasic/multiple screening (applying >1 screening test at one time to detect a single disease
Prescriptive screening (for benefit of patients)
Prospective screening (for the future benefit of community)

RELATIONSHIP BETWEEN SENSITIVITY SPECIFICITY AND PREDICTIVE VALUES

- **Sensitivity and Specificity Are Inversely Proportional.**

E g. Let Us Take 4 Persons with Fasting Blood Sugar (FBS) Values as Mentioned

- Person A-75gm%
- Person B-95gm%
- Person C-135gm%
- Person D- 155gm%
- A and B are nondiabetic.
- C and D are diabetic.

- **If we increase the FBS cut off is increased from 126gm% to 140gm%**, person D alone becomes positive and persons A B C are negative. Thus, the positive results decreased and negative results increased **(sensitivity decreased & specificity has increased**)

- **If the FBS cut off is decreased to 80gm% →** A alone becomes negative and B C D are positive. So, when the cut off is generated the positive result increased and the negative results decreased. Thus, **increasing sensitivity and decreasing specificity.**

- **When the cut off was increased →**
  - D alone was found to be positive. Thereby ***INCREASING the Positive Predictive value***
  - Though C was found to be negative, in reality C is diseased and hence his ***negative productive value is LESS***. It is only due to high cut off, that C was found to be negative.

- **Similarly, when the cut off was decreased →**
  - A was still found to be negative (80gm% is still less). This means that his **negative productive value has INCREASED.**
  - Now person B was found to be positive by the low FBS cut off but we know in reality that he is non diabetic. So, his **positive productive value has DECREASED.**

IMPORTANT QUESTIONS

i. **When the cut off is increased** → Sensitivity decreases and the specificity increases
→ PPV increases and the NPV decreases.

ii. **When the cut off is decreased** → Sensitivity increases specificity decreases
→ PPV decreases and the NPV increases.

iii. Sensitivity and specificity are inversely related

iv. NPV and PPV are inversely related.

v. Specificity and PPV are directly related

vi. Sensitivity and NPV value are directly related

- In screening for disease, a prior decision is made about the cut-off point where following factors are taken into consideration:
  a. Disease prevalence: If P is high the screening level is set at a lower level, which will increase sensitivity
  b. The disease: If the disease is very and early detection markedly improves prognosis, a greater degree of sensitivity, even at the expense of specificity, is desired
  - Whereas in a prevalent disease like diabetes for which treatment does not markedly alter outcome, specificity must be high and early cases may be missed, but false-positives should be limited; otherwise, the health system will be overburdened. Thus, high specificity is necessary when false-positive errors must be avoided.

FACTORS AFFECTING PPV

Example: Sensitivity = 99%; Specificity = 95%					
Disease Prevalence	**Test Results**	**Sick**	**Not Sick**	**Totals**	**Positive Predictive Value**
1%	+	99	495	594	99/594= 17%
	-	1	9,405	9406	
	Totals	100	9900	10000	
5%	+	495	475	970	495/970= 51%
	-	5	9025	9303	
	Totals	500	9500	10000	

- Prevalence of a disease is 1%
  - A test that has got 99% sensitivity and specificity 95% is applied.
  - There are 10,000 people in that population. Since prevalence is 1%, So naturally 1% of 10,000 would be diseased and the rest 99% would be non-diseased.
  - 1% of this 10,000 is 100. Thus, we have 100 diseased and 9900 non diseased
  - Sensitivity is 99% so 99 of 100 is *true positives*

- And 95% of 9900 i.e., 9405 became *true negative*
  - **PPV = 99/594= 17%**

- If prevalence is increased from 1% to 5%.
  - 5% of 10,000 will be diseased and rest will be non-diseased.
  - Sensitivity and specificity is the same i.e. 99% sensitivity and 95% specificity,
  - 99% of 500 i.e., 495 are positive. (So here as the prevalence went up from 1% to 5% the PPV also changed from 99 to 495.)
    - **PPV= 475/970= 51%**

- Thus, a 4% increase in the prevalence has brought a huge increase in the PPV.

High Risk Screening

- **As prevalence increases PPV increases as well.**
- A disease with - Prevalence 20%
  - Sensitivity = 50%
  - Specificity = 50%
  - Total population is 1000

- PPV = 100/500= 20%, 20% of 1000, that means 200 will be diseased and 800 will be non-diseased.
- Sensitivity and specificity is 50% each

- Now when we increase sensitivity to 90%, 90% of 200, that is, 180 become positive and the rest 20 become negative
- So PPV becomes = 180/580 = 31%

- **So as sensitivity increases PPV also increases.**
- Now when we change the specificity to 90%
- Out of 800, 90% become true negative, that is, 720 become true negatives and only 80 are left in false positives.

- **PPV = 100/180 = 56%**
- So, from 20% PPV has increased to 56%
- This means as **specificity increases PPV increases.**
- **The change in PPV is more with specificity than with sensitivity.**

Summary

- PPV is directly proportional to prevalence, specificity, sensitivity.

- PPV increase is more with prevalence, followed by specificity followed by sensitivity.
  That is**, PPV ∝ prevalence >specificity> sensitivity.**

- As True Positives increases PPV increases
- As false positives increase PPV decreases

- Sensitivity and specificity are fixed for a test.

Few Important Points:

- The complement of the PPV is the False discovery rate (FDR): 1-PPV
- The complement of the NPV is the **false omission rate** (FOR): 1-NPV

TYPE 1 AND TYPE 2 ERRORS

- Type 1 and type 2 errors are used with regard to **drug trials and statistical hypothesis testing.**
- Before bringing any drug into the market, it is mandatory that it undergoes a drug trial to prove that it is better than the drug that is existing.
- For example, and we are subjecting our new drug to a drug trial.
- In reality there can be two possibilities:
  i. Our drug is better than the one that is existing
  ii.Our drug is not as good as the one that is existing

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	Truth effective	Truth Not effective
Trial result effective	True positive Result	False positive result
Trial result non effective	False negative result	True negative result

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- Giving a false positive result is known as **type 1 error (Alpha error)**
- Giving a false negative result is known as **type 2 error (Beta error)**
- **Type 1 error we are harming the patient**. E.g., due to false positive result, inferior drug replaces a better drug in the market and patients suffer

- **Type 2 error we are not able to help the patient**. Due to false negative result, we have a better drug/ molecule but are not able to provide it to the patients.
- So, type 1 error is worse than type 2 error. i.e., alpha error is more serious than beta error.
  - A perfect test would have zero false positives and zero false negatives, but its uncertain, thus there is possibility of making errors. Thus, we have given
  - **A cut off values for errors that is allowable.**

Cut offs fixed for type 1 and type 2

- **Type 1 error maximum cut off is 5%.**
- **Type 2 error maximum cut off is 10-20%.**

	Disease +	Disease -
Test +	a.True Positive	b. False Positive
Test -	c. False Negative	d. True Negative

- At one point of time, the number of patients with one particular disease and the number of patients without that particular disease will be a constant number.
- This means that - **a+c is constant**
  - **b+d is also a constant**
- a is sensitivity
- d is specificity
- b is false positivity which is type 1 error
- c is false negative which is type 2 error

- Since **a+c is a constant → as sensitivity increases → type 2 error comes down**
- Since **b+d is a constant → as specificity increases → type 1 error comes down.**
- **Power of a test in terms of error = 1- type 2 error (or) 1 - Beta error.**

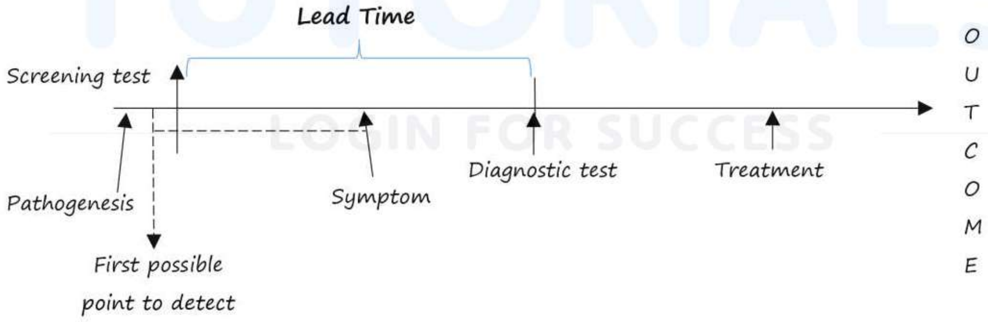
$$\boxed{\text{Power} = 1 - \text{Beta error}}$$

- These two types of error rates are traded off against each other: for any given sample set, the effort to reduce one type of error generally results in increasing the other type of error.

LEAD TIME AND LENGTH TIME BIAS

Natural History of Disease 00:00:20

- First pathogenesis of disease starts
- Symptoms develop
- A consultant doctor forms a diagnosis – tests are performed
- Treatment is stacked
- Outcome
- Before the symptoms start – There is First possible point to detect
- In between the first possible point to detect and appearance of symptoms a screening test is performed
- The duration between screening test & diagnostic test called lead time

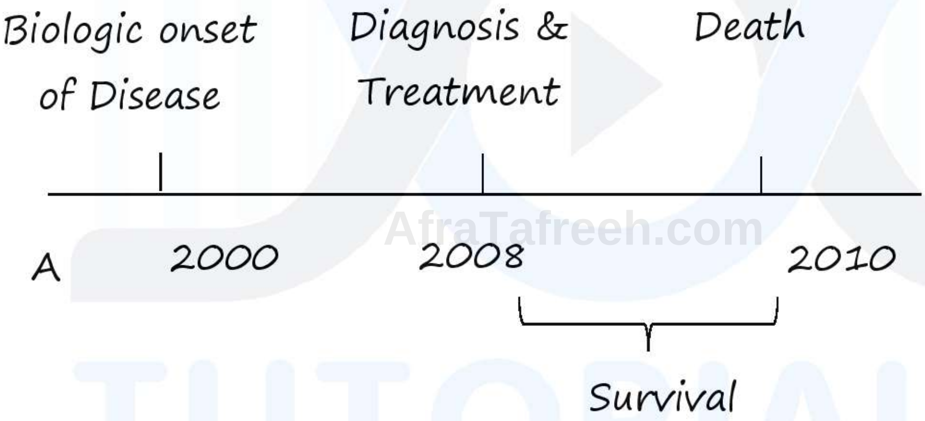

Lead Time
Screening test
Pathogenesis
First possible point to detect
Symptom
Diagnostic test
Treatment
OUTCOME

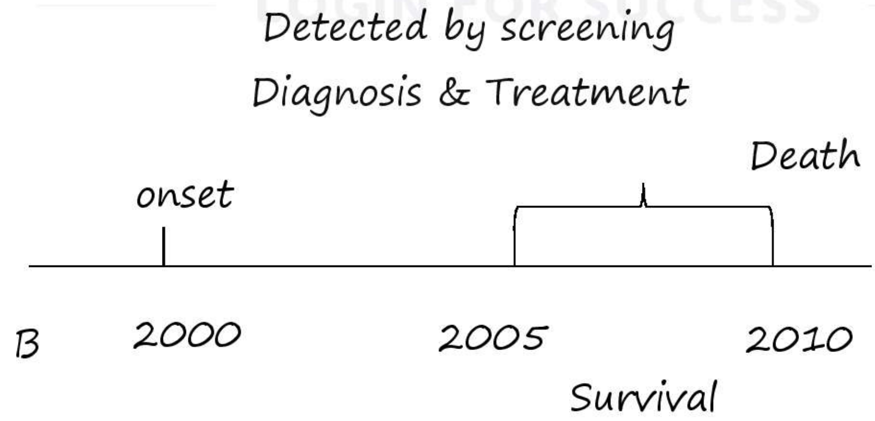
Lead time – Advantage gained by the screening test

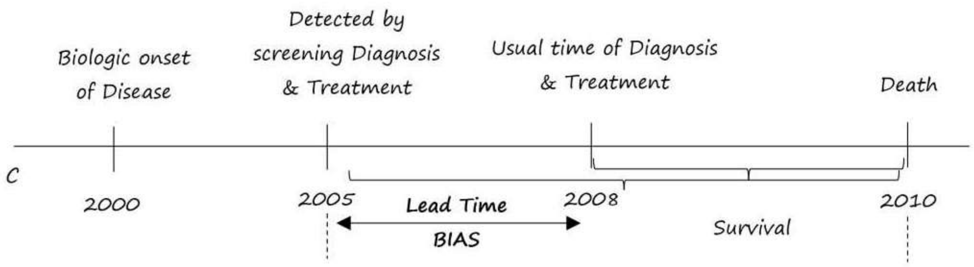
– It is time gap between screening & diagnostic tests

Lead time Bias error 00:01:50

- **Critical point** – If the disease is picked up before the critical point, the prognosis is good and the survival rate increases.
- **Lead time bias** is detecting the disease **after** criteria point → hence no improvement in prognosis & Survival rate.
- **Over estimating the survival rate of the patient due to lead time (due to earlier detection by screening than clinical presentation.) is called Lead Time Bias**


Biologic onset of Disease
Diagnosis & Treatment
Death
A
2000
2008
2010
Survival


Detected by screening Diagnosis & Treatment
Death
onset
B
2000
2005
2010
Survival


Biologic onset
of Disease
Detected by
screening Diagnosis
& Treatment
Usual time of Diagnosis
& Treatment
Death
C
2000
2005
Lead Time
BIAS
2008
Survival
2010

- Lead time bias is also known as **zero time shift bias**

Length time bias 00:10:10

- Overestimation of survival duration due to the relative excess of cases detected that are slowly progressing
- Due to difference in latent periods for same disease
- E.g. HIV, TB, Leprosy
  - Length-time bias is due to slow cases being detected more often simply because they are slowly progressing. Remember the "g" in length is for slowly progressing
  - Lead-time bias is due to early detection. Remember the "d" in lead is for early detection

COMBINING SCREENING TESTS

- When it comes to real practice, more than one test for detecting one single disease are applied.
  - E.g. for detection of carcinoma breast most doctors prescribe mammogram with USG correlation.
- We can combine a test in 2 methods
  - i. **Combining in series**: one followed by another/ sequential testing/ two stage
  - ii. **Combining in parallel**: also known as simultaneous testing.

Combining in Series:

- Example: When ELISA is applied followed by Western blot
- The intention was to **decrease the number of HIV positives and increase the number of HIV negatives**
  → This is an example of testing in series.
- So here the:
  - i. Sensitivity decreases
  - ii. Specificity increases
  - iii. PPV: increases
  - iv. NPV: decreases
    - After the 1st screening test is conducted, those who test positive are only tested with the 2nd screening test:

- Disease positives: Those who test positive in both the tests (If 1st test is positive, he must test positive in 2nd test as well)
- Disease negatives: Those who test negative in either of the tests
- So, this test will have:
- Less false positives: Increased specificity and PPV
- More false negatives: Decreased sensitivity and NPV

TUTORIALS LOGIN FOR SUCCESS

Combining in Parallel:

- For a TB survey in a population, Mantoux, sputum and chest x-ray are prescribed simultaneously to everyone. This is an example for testing in parallel.
- The intention is to **increase the positive results** and to **decrease the negative results.**
- So, when we apply a test in parallel-

  i. The sensitivity increases

  ii. Specificity decreases

  iii. PPV: decreases

  iv. NPV: increases

- 2 screening tests are applied simultaneously:
- Disease positives: Test positive in either of the two tests (If one test is negative, still the other test can prove positive)

- Disease negatives: Test negative in both the tests (If one test is negative, the other test must also be negative)
- So, this test will have:
- Less false negatives (increased sensitivity and increased negative predictive value or NPV)
- More false positives (decreased sensitivity and decreased positive predictive value or PPV)

- Series combination
  - Net sensitivity= Sensitivity of 1st x Sensitivity of 2nd
  - Net specificity= (specificity of 1 + specificity of 2) – (specificity of 1st x specificity of 2nd)
- Parallel combination
  - Net sensitivity= (sensitivity of 1st + sensitivity of 2nd) – (sensitivity of 1st x sensitivity of 2nd)
  - Net specificity = (specificity of 1st x specificity of 2nd)

LEVELS OF PREVENTION

- Natural history of a disease is a phenomenon by which a disease evolves over time from its initial stage till end, in the absence of external intervention.

Natural history of disease: 00:00:15

Healthy community (Free of Risk Factors)
↓
Risk factors +Host
↓ Pre-pathogenesis phase
↓ Pathogenesis
Disease progress
↓
Complications

- Prevention includes a wide range of activities — known as "interventions" — aimed at reducing risks or threats to health.
  - Depending on the point from where we intervene, four levels of prevention, are as follows:
    i. Primordial prevention
    ii. Primary prevention
    iii. Secondary prevention
    iv. Tertiary prevention

- **Primordial prevention** → The very first stage is intervened and the occurrence of risk factors in a community are prevented.
- **Primary prevention** → If the **pre pathogenesis phase** is intervened, it is known as primary prevention, where, the occurrence of a disease full of risk factors is prevented. Here the risk factors are present.
- The pathogenesis phase is again divided into
  - **Early pathogenesis** → Intervention applied → **Secondary prevention**
  - **Late pathogenesis** → Intervention applied → Irreversible stage → We only prevent further disability and provide rehabilitation to patient → **Tertiary prevention**

Summary

- **Primordial** – preventing appearance of risk factors
- **Primary** – Risk factors present, we prevent disease
- **Secondary**– early pathogenesis, full recovery possible
- **Tertiary**– late pathogenesis, full recovery not possible we prevent further disability

Levels of prevention	Definition	Modes of intervention	Example
Primordial	Preventing the emergence of **risk factors**	→ Health education	**Educating** children at early age about inhibiting emergence of environmental, economic, social & behavioral condition.
Primary	Action taken **prior to onset of the disease**	→ Health promotion → Specific protection	Protection of health by personal, & community efforts, such as **enhancing nutritional status, immunization & eliminating env risks** etc
Secondary	Halts progress of the disease **at incipient stage** and prevents its complications	→ Early diagnosis → Treatment	Through **screening programme** and **appropriate treatment** methods
Tertiary	Action taken at **advanced stage** to reduce disabilities	→ Disability limitation (preventing the transition of disability into handicap) → Rehabilitation: (a) Medical rehabilitation –	Minimizing suffering and maximizing potential years of useful life. Like **providing crutches to a person who can't walk**

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		restoration of function. (b) Vocational rehabilitation - restoration of the capacity to earn a livelihood. (c) Social rehabilitation - restoration of family and social relationships. (d) Psychological rehabilitation - restoration of personal dignity and confidence	

VALIDITY

- It is the ability to measure **true value.**
- Ability of test to measure what it is supposed to measure.
- If research has high validity, that means it produces results that correspond to real properties, characteristics, and variations in the physical or social world.
- 2 components of validity – sensitivity & specificity.
  i. True positive (sensitivity)
  ii. True negative (specificity)

Accuracy: 00:02:55

- Validity is the property of **a test**.
- Accuracy is property of the **result**.

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1. Accuracy formula (**Rand index**/Rand accuracy, true positives + true negative):

- $$\frac{TP + TN}{TP + TN + FP + FN}$$

  - This formula is also known as **efficiency of a screening test.**

2. Balanced accuracy:

- It is the balance between $\frac{\text{Sensitivity + Specificity.}}{2}$

3.Accuracy = **(Sensitivity x prevalence)** + **{Specificity + (1-prevalence)}**

4.Youden's index:

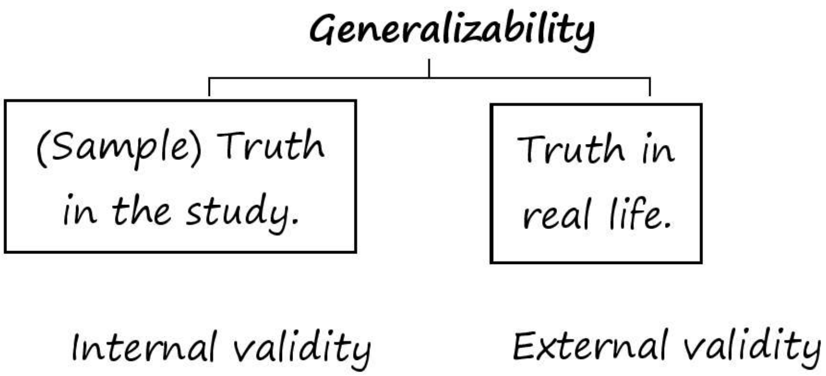
- Also called **Youdens 'J' statistics**
- 'J' = TP – FP.

  = Sensitivity – (1- Specificity).

  = Sensitivity + Specificity – 1.
- Values of J:
  - Range from 0 to 1.
  - 1 → perfect test.
  - 0 → useless test.
  - 'J' is used in **ROC (Receiver Operated Characteristic curve) curve.**

Types of validity:

- Internal validity – whether the Results are truly applicable to study sample.
- External validity – whether the Results are truly applicable to population.
- Study Sample is described as the population that represents the entire population that is being tested


Generalizability
(Sample) Truth in the study.
Truth in real life.
Internal validity
External validity

- Validity could be, construct validity, content validity & criterion validity
- To assess the validity of a cause-and-effect relationship, you also need to consider internal validity (the design of the experiment) and external validity (the generalizability of the results)

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RELIABILITY

- Reliability means **yielding same result when repeated.**
- It is also known as **repeatability, reproducibility, precision, consistency**
- **Reliability refers to how consistently a method measures something. If the same result can be consistently achieved by using the same methods under the same circumstances, the measurement is considered reliable.**
- **Types of reliability**

  Test-retest, Interrater, internal consistency

  Reliability can be ensured by applying methods consistently and standardizing the conditions of your research
- It is measured using

  i. Pearson's product moment correlation coefficient

  ii. Cronbach's Alpha

Factors contributing to reliability 00:03:00

i. Intra subject variation e. g. BP, respiratory rate, heart rate, pulse rate (measured using averages)

ii. Intra observer variation (measured using averages)

iii. Inter observer variation (measured using agreement percentage) by what % both observers agree with each other

		Triage nurse		
		High risk	**Low risk**	**Total**
Nurse administrator	High risk	9	2	11
	Low risk	1	13	14
	Total	10	15	25

Overall percentage agreement

$$\frac{\text{Sum of all readings agreed by both}}{\text{Total no. of readings}} \times 100$$

$$\frac{9+13}{25} = 88\%$$

Overall agreement is:

- True agreement + by chance agreement
- The percentage of the agreement between two observers is to be known

The formula is: Cohen's Kappa

$$\frac{\text{Total agreement (\%)} - \text{by chance agreement (\%)}}{100\% - \text{By chance agreement (\%)}}$$

Pathologist A

	Grade II	Grade III	
Grade II	41	3	44
Grade III	4	27	31
Pathologist B	45	30	75

- Total agreement is

$$\frac{41 + 27}{75} = 90.7\%$$

- What is the agreement between pathologist A & B by chance?
- By chance value = $\frac{\text{Row total X column total}}{\text{Grand total}}$

$$= \frac{44 \times 45}{75}$$

$$= \frac{44 \times 30}{75}$$

$$= \frac{31 \times 30}{7}$$

$$= \frac{31 \times 45}{75}$$

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Pathologist A

	Grade II	Grade III	
Grade II	41 (26.4)	3 (17.6)	44
Grade III	4 (18.6)	27 (12.4)	31
Pathologist B	45	30	75

- 26.4% were agreed to be grade 2 by both pathologists A and B
- 12.4 % were agreed to be grade 3 by both pathologists A and B
- The by chance agreement would be

$$\frac{26.4 + 12.4}{75} = 51.7\%$$

Cohens Kappa 00:13:00

$$\frac{90.7 - 51.7}{100 - 51.7} = 39/48.3 = 0.8$$

Interpretation 00:20:15

- Kappa > 0.75 is excellent agreement beyond by chance
- Kappa < 0.4 is poor agreement between both the observers

- Value between 0.4 to 0.75 it is intermediate to good agreement

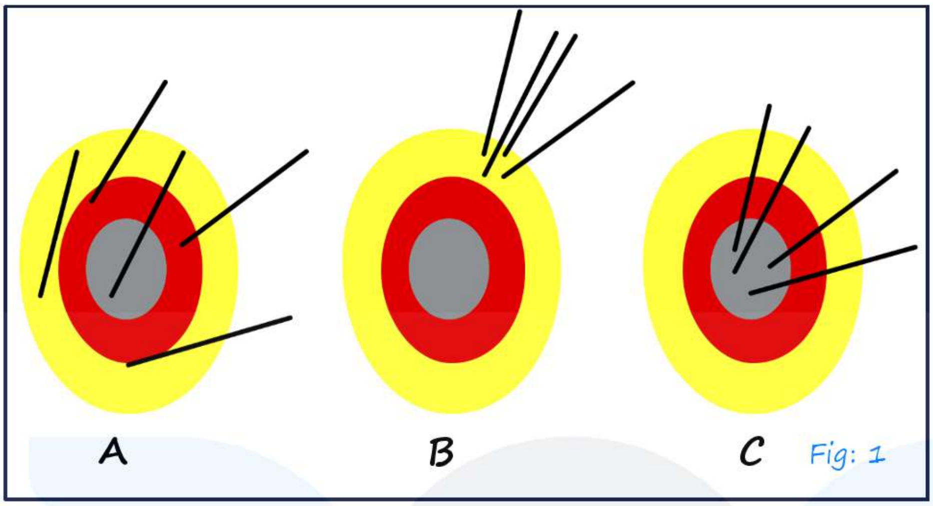
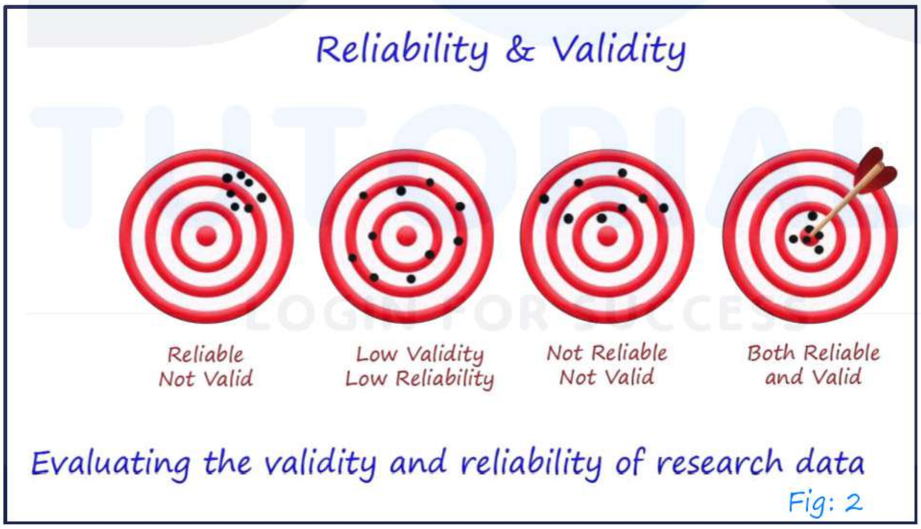


Fig: 1

- A has good accuracy poor precision.
- B has poor accuracy but good precision
- C has good accuracy and good precision


Reliability & Validity
Reliable
Not Valid
Low Validity
Low Reliability
Not Reliable
Not Valid
Both Reliable
and Valid

Evaluating the validity and reliability of research data

Fig: 2

INTRODUCTION TO DEMOGRAPHY

Demography: examines the size, structure, and movements of populations over space and time.

- Scientifically studying population.

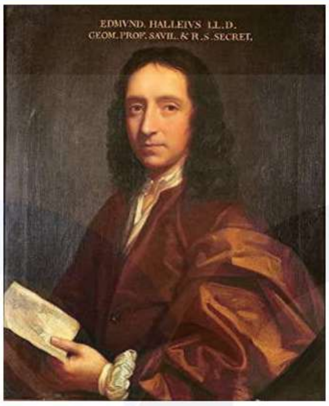

EDMVND. HALLEIVS LL.D.
GEOM. PROF. SAVIL. & R.S. SECRET.

Fig: 1

John Graunt- Wrote the Book "Bills of Mortality"

- John Graunt is Known as the **Father of Demography**
- In demography the population is described mainly under 3 headings

  1.Size of the population

  2.Composition (%of male, %of female, %of adults, %of children, etc.)

  3.Distribution (Urban/Rural/Coastal area etc.)

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Population Size 00:04:08

- India is the **2^{nd} most populous** country in the world (**1.38 billion** (june2020)).
- **In 2021, China remains the country with the largest population in the world, with more than 1.4 billion people.**
- **India has the second largest population in the world, with just under 1.4 billion inhabitants**
- 1/5th (18%) of the world's population lives in India.
- 1 billion mark was reached in 1998
- By 2022 we will be the most populous country in the world.
- The most populous state in India is **UP > Maharashtra > Bihar.**
- Union territory is Delhi
- Least populous state is **Sikkim**
- Union territory which is **least populous is Lakshadweep** (around 64000)

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Demographic Process 00:06:40

- There are 5 demographic processes.
  i. Fertility- as fertility increases population also increases
  ii. Mortality-as mortality increases size decreases

iii. Marriage-if you are married into a population, the size increases. If you are married out of a population, the size of that population decreases.

iv. Migration- if we are immigrating, the size of that country increases. If we are emigrating the size of that country decreases

v. Social mobility-it is the movement of one social class to another but, in this context, it means temporary movement from one place to another.

Demographic Equation 00:09:40

- Consider 'Pt' as last year population
- from the last year to the present year → p(t+1)
- Formula to calculate the present year's population is:

$$\boxed{P(t+1) = Pt + \text{Births} - \text{deaths} + \text{immigration} - \text{emigration}}$$

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TOOLS OR SOURCE OF POPULATION DATA

Sources of information:

1.Census

2.Civil registration

3.SRS

4.NFHS (National family health service)

1. Census: 00:00:50

- A population census is the total process of collecting, compiling, evaluating, analyzing and publishing or otherwise disseminating demographic, economic and social data pertaining, at a specified time, to all persons in a country or in a well delimited part of a country.
- First census – 1872
- First Regular census – 1881
- Frequency – 10 years
- **15th census of India -2011**
- Census is done from **9th – 28th February**
- On 28th night houseless enumeration is done.
- Houseless enumeration is done at night time to assess the number of homeless people present.
- **Counting is stopped at 1st march at 00:00, It is called as census stop or census moment.**

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- Revisional round is from **1st – 5th march.**

Types of censuses:

- There are 2 types
  - i. De facto system – belonging to where you were found the time of census
  - ii. De Jure system – legal/original place of residence
    - Until 1931 – De facto system
    - from **1941 – De jure system is followed** till present.

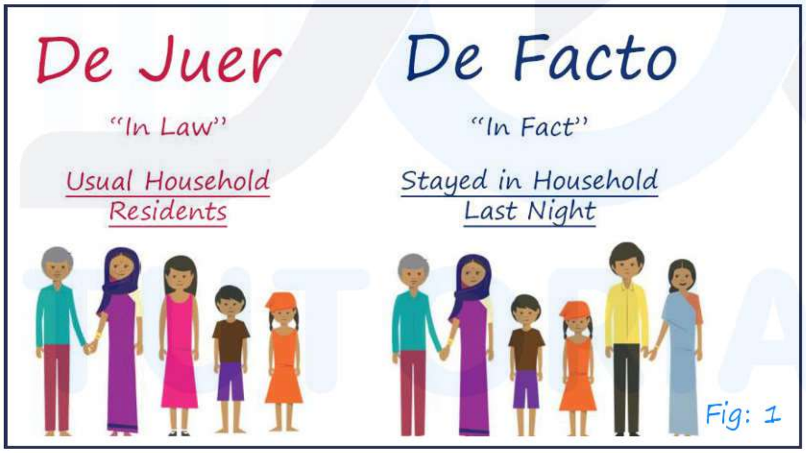
De Juer
"In Law"
Usual Household Residents
De Facto
"In Fact"
Stayed in Household Last Night

Fig: 1

2. Civil registration system: 00:07:00

- Civil Registration System (CRS) may be defined as a unified process of continuous, permanent, compulsory and universal recording of the vital events and characteristics thereof, as per legal requirements in the country.
  - Birth and death registration system

Birth and Death
Registration

Fig: 2

i. Births should be registered within – **21 days**

ii. Deaths should be registered within – **21 days**

iii. Marriage should be registered within – **45 days**

- If a child is born outside India, he /she should be registered within **60 days** after returning to India.

3. Sample registration system [SRS]: 00:10:00

- SRS is a demographic survey for providing reliable annual estimates of infant mortality rate, birth rate, death rate and other fertility and mortality indicators at the national and sub-national levels.

- 2 officers work in the field.
  i. 1st officer – continuously collects information from field.
  ii. 2nd officer – cross checks the information collected by 1st officer every 6th month.
- SRS is also known as **dual record system.**

- It is considered as **most reliable method** of fertility and mortality.

4. National family health survey: 00:12:16

- The National Family Health Survey (NFHS) is a large-scale, multi-round survey conducted in a representative sample of households throughout India.
- It provides an indicator for tracking 30 Sustainable Development Goals (SDGs) that the country aims to achieve by 2030.
- The sampling method used here is – **Unistage stratified simple random sampling.**
- Sample size is determined by **Infant Mortality Rate.**
- Nodal agency **IIPS** (international institute of population science, Mumbai)
- No of rounds completed are **4 rounds** (1992–93, 1998–99, 2005–06 and 2015–16)
- As per NFHS – 4
  - Infant mortality rate of Kerala – 6/1000 live births
  - Under 5 mortality of Kerala – 7/1000 LB at par with US
- The first phase of the fifth round of the National Family Health Survey (NFHS-5) was conducted in

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2019-20 and its findings were released in December 2020.

- NFHS-5 includes some new topics, such as preschool education, disability, access to a toilet facility, death registration, bathing practices during menstruation, and methods and reasons for abortion.

FERTILITY RATES

7 fertility rates: 00:00:30

i. Crude birth rate →

$$\frac{\text{No. of live births during the year}}{\text{Means year population (MYP)}} \times 1000$$

ii. General fertility (GFR) rate:

$$\frac{\text{No. of live births in an area during the year}}{\text{Women in the reproductive age group (15-49) in the same area same year.}} \times 1000$$

iii. General marital fertility (GMFR) rate →

$$\frac{\text{No. of live births}}{\text{Married women in reproductive age group15-49 yr}} \times 1000$$

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iv. Age specific fertility (ASFR) rate →

$$\frac{\text{No. of live births in an age group}}{\text{MYP of women in same age group}} \times 1000$$

v. Total fertility rate (TFR) →The average number of children a woman would have if she were to pass through her reproductive years bearing children at the same rates as the women now in each age group

- Total children by a couple (girls + boys).
- Measure of completed family size.
- Replacement level **TFR = 2.1** (developed countries).
- It is a synthetic measure.
- A.k.a **standardized index of fertility.**

$$\text{TFR} - \frac{5 \times \sum_{15-19}^{45-49} \text{ASFR}}{1000}$$

vi. Gross reproduction rate (GRR): Average number of girls that would be born to a woman if she experiences the current fertility pattern throughout her reproductive span (15-44 or 49 years), assuming no mortality.

- Number of **daughters**
- Given birth by **married women**. (Assuming no mortality)
- GRR = 1/2 TFR.

$$GRR = \frac{5 \times \sum_{15-19}^{45-49} \text{ASFR for female live births}}{1000}$$

vii. Net reproduction rate (NRR): number of daughters a newborn girl will bear during her lifetime assuming fixed age-specific fertility and mortality rates

- No of **daughters.**
- **New born** girl
- Assuming mortality.
- NRR of 1 = 2 child norm, NRR = 1/2 TFR.

Categorization states based on TFR 00:13:00

- **Very high focus** → 3 → Bihar, up , Meghalaya.
- **High focus** → < 3 to > 2.1 → Assam , Dadra , Mizoram , Manipur , Nagaland , Chhattisgarh , Jharkhand , Rajasthan , MP.
- **Non high focus** → < 2.1.

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Jansankhya sthirata kosh (JSK) 00:13:53

- JSK is a registered society of the Ministry of Health and Family Welfare, Government of India started with a Rs 100 crore grant from government.
- The society was established with the objective of highlighting the need for population stabilization.
- Also known as National population stabilization fund

JANSANKHYA
STHIRATA KOSH

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- To stabilize population by **2045**
- To stabilize population, there are 3 criteria.

i. TFR = 2.1

ii. NRR = 1

iii. CPR > 60% (couple protection rate).

- Relation between total fertility rate (TFR) and crude birth rate (CBR).

$$\boxed{CBR \sim (TFR \times 8) + 1}$$

SEX RATIO AND AGE/ POPULATION PYRAMID

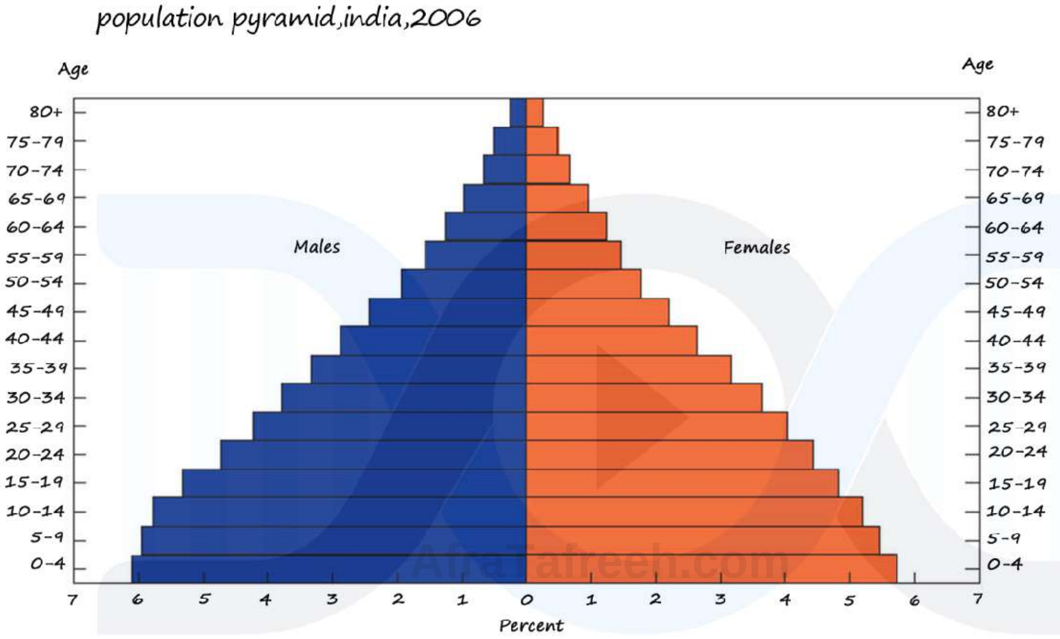
Sex ratio: 00:00:26

- It is the number of females per 1000 males in the population.
- Sex ratio of India: 940
- State with highest sex ratio is Kerala: 1084
- Pondicherry also has a positive sex ratio but it is a union territory
- State with **lowest sex ratio is Haryana:** 877
- District with highest sex ratio is Mahe (1176/1000)
- District with lowest sex ratio Daman (Daman & Diu)
- Sex ratio is a sensitive indicator of status of women.
  - Child sex ratio (here we consider age group 0-6years)
  - It is the number of girls 0-6 years per 1000 boys 0-6 years.
  - Highest child sex ratio is in **Mizoram**- 971
  - Lowest child sex ratio is in **Haryana** - 830
  - Child Sex ratio of India is - 914

Age pyramid / population pyramid 00:03:52

- It is a graph that shows the distribution of ages across a population divided down the center between male and female members of the population.

- The graphic starts from youngest at the bottom to oldest at the top.
- As the name indicates, it is a graph in which various age groups in a population are arranged in the form of a pyramid



- Along the Y axis different age groups are arranged at an interval of 5.
- Along the X axis percentage of population falling under each of the age groups is arranged.
- Towards the left are males & towards the right are females.
  - Explanation: in the year 2006 in India in the age group 0-4yrs there were **6.2% of males** where as **5.8% of females** in the same age group

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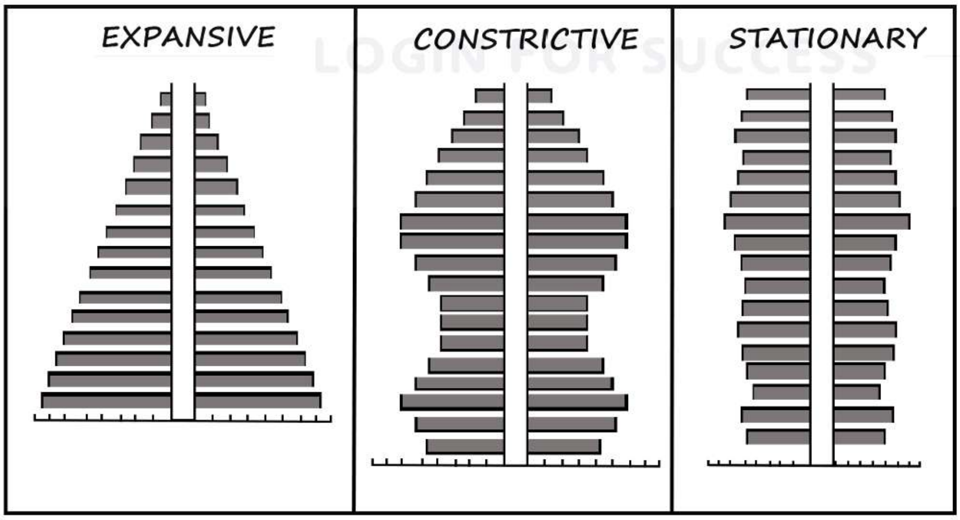
- The age pyramid/ population pyramid is formed by combining two histograms one from male side and another from female side.
- Population pyramid is also known as **double histogram**
- There are three main trends in populations that affect the shape of a population pyramid.
- Expansive: when there are both high fertility and high mortality rates among younger members., creates a sharp triangle shape in the graph.
- Constrictive: when there is a lower mortality rate with the fertility rate remaining constant. These population pyramids are wider in the middle of the graph as the population has high numbers of middle aged and elderly people, but fewer young people.
- Stationary: When population with low mortality and low fertility rates.

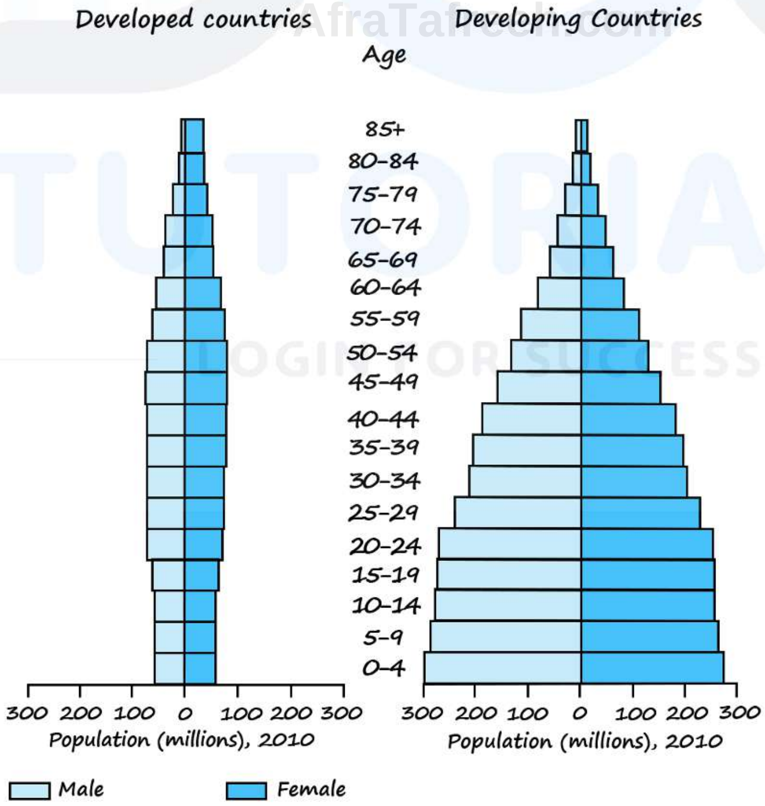


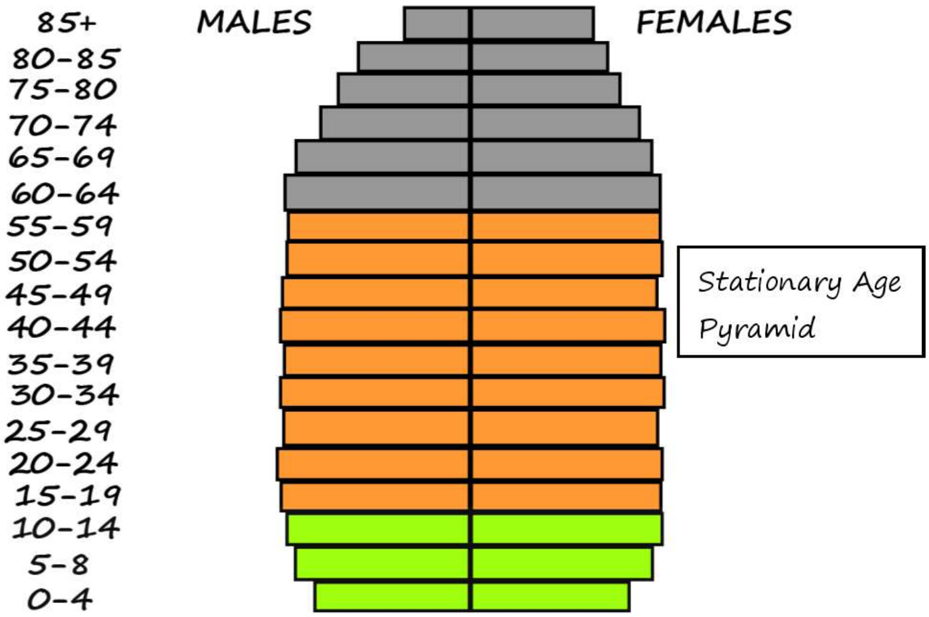
Uses 00:07:20

i. Tells us about sex ratio

ii. The shape will tell us about **fertility of the country**. If the base of the pyramid is broad, the fertility of the country is more. As fertility decreases, the base becomes narrow.

- In developing countries, the base of the pyramid is broad and the top of the pyramid is narrow, for developed countries the base is narrow and top is also narrow with wider middle part, so the graph is more spindle shaped. Hence **age pyramid of developed countries is called as spindle shaped.**





- Stationary age pyramid-seen in countries where **birth rate and death rate is also less** (fertility rate is less and mortality rate is also less). It is also known as clock model age pyramid or Urn model.

iii. **Life expectancy**: if the pyramid is tall, life expectancy of that country is more.

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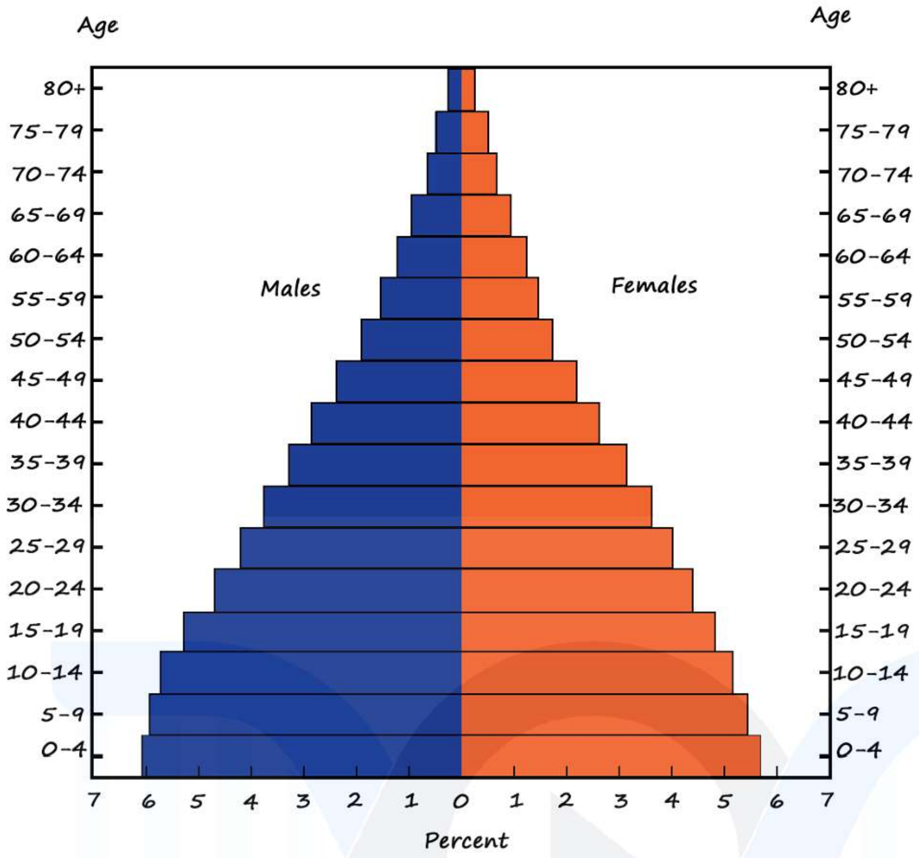

- If the pyramid is short that means life expectancy of that country is less.

iv. Named age groups:

- UN/WHO Definitions are as follows:
- Adolescent- 10 to 19 years
- Youth - 15 to 24 years
- Young people- 10 to 24 years

v. **Dependency ratio of a country**:

- It is a measure of the number of dependents aged zero to 14 and over the age of 65, compared with the total population aged 15 to 64. This demographic indicator gives insight into the number of people of non-working age, compared with the number of those of working age.

- young dependents are at the base and older dependents are at the top of the pyramid.

According to UNICEF

- Early adolescence (10-14 years)
- Late adolescence (15-19 years)

DEPENDENCY RATIO & LITERARY RATE

- The dependency ratio is a measure of the number of dependents aged zero to 14 and over the age of 65, compared with the total population aged 15 to 64.
- This demographic indicator gives insight into the number of people of non-working age, compared with the number of those of working age.
- Young age dependent – Age < 15 years
- Old age dependent – Age > 64years

Formula for dependency ratio

$$\frac{\text{Age} < 15+ \text{ years} + >64 \text{ years}}{15 \text{ to } 64 \text{ years}} = \text{Dependency ratio}$$

- It is also known as societal dependency ratio
- Dependency ratio in India is of 2019 → 54.1
- Highest DR – for Niger
- Lowest DR – for Qatar

Potential support ratio (PSR) 00:02:40

- It is the number of people age 15-64 per one older person aged 65 or older.
- This ratio describes the burden placed on the working population (unemployment and children are not considered in this measure) by the non-working elderly population.
- Number of people present to support elderly.
- Formula of PSR = $\frac{\text{Number of people 15-64 years}}{\text{Number of people > 64 years}}$
- Country with lowest PSR – **Japan (PSR – 2.1)**
- In **India PSR – (10)**

Literary rate 00:05:12

- A person who can read & write in **any language** with understanding.
- cut off Age - **7 years**
- **Crude literary rate** – Where denominator will be mid-year population
- **Aliteracy** - Able to read & write but uninterested in doing so
- International literacy day – **8th September**
- For calculating Literacy rate: Divide the number of literates of a given age range by the corresponding age group population and multiply the result by 100.

- The literacy rate of Indian population as per census 2011 – 74.04%
  - Female literacy rate is – 65%
  - Male literacy rate is – 82%
  - Highest literary rate is – Kerala > Lakshadweep >Mizoram > Tripura > Goa
  - Lowest literary rate is – Bihar – 67.8%

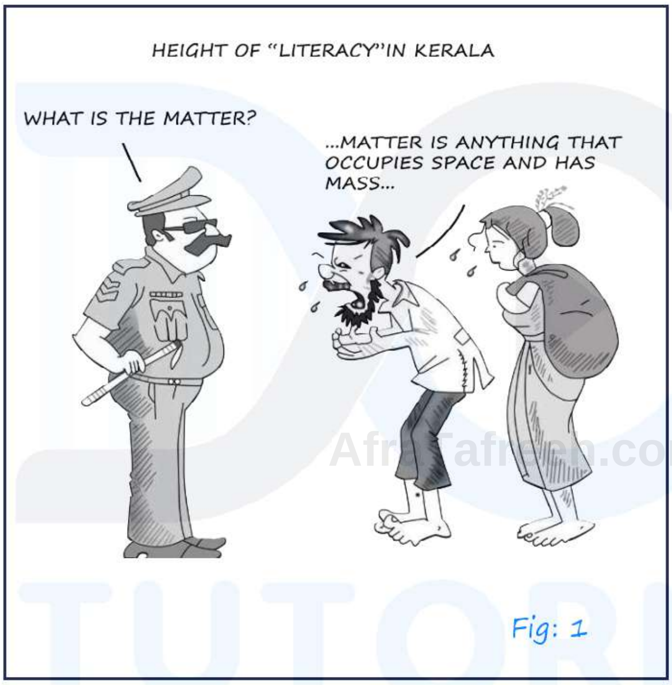
HEIGHT OF “LITERACY”IN KERALA
WHAT IS THE MATTER?
...MATTER IS ANYTHING THAT OCCUPIES SPACE AND HAS MASS...

Fig: 1

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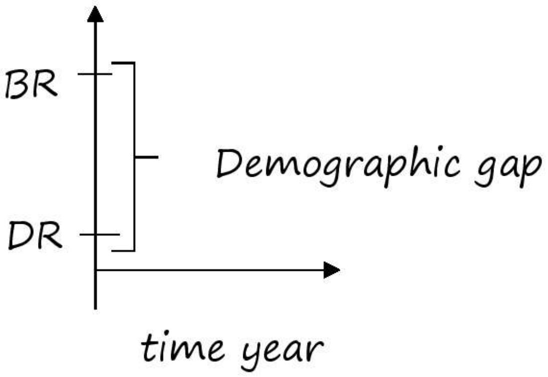
DEMOGRAPHIC CYCLE

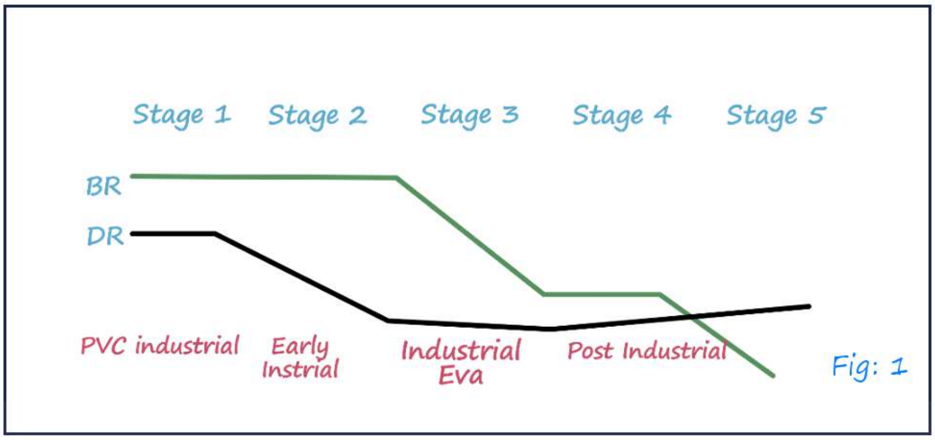
- The demographic cycle, or population cycle, refers to the evolution over time of the population profile of a country, region or other defined geographical area. A population cycle theory has been postulated in terms of the socio-economic history of industrialized countries.
- There are 5 stages of a demographic cycle (00:32)

Stages	Name of Phase
Stage 1	High Stationary
Stage 2	Early expanding
Stage 3	Late expanding
Stage 4	Low stationary
Stage 5	Declining

- All the above stages are described by **shape of demographic gap**
- Demographic gap – difference between birth & death rate



- BR – DR ≃ **Annual growth rate (03:46)**



- Stage 1 – Preindustrial era
  - BR & DR both were high. So, difference was stationary

- Stage 2 – Early industrial era
  - Death rate was decreased birth rate was same as stage 1

- Stage 3 – Industrial era
  - Family planning was introduced and hence, people started using contraceptives.
  - Death rate decreased and birth rate also started declining

- Stage 4 – Postindustrial era
  - Lowered birth rate and death rate

- Stage 5- Declining population
  - Birth rate declines death rate is same as stage 4

- Demographic gap starts increasing in early stage 2
- Demographic gap is maximum in late stage 2
- Demographic gap starts declining in early stage 3
- Demographic gap is narrow – at stage 1 & 4
- Demographic gap is negative in stage 5

  Eg: Germany, Italy, Spain, Portugal, Greece, UK, Japan

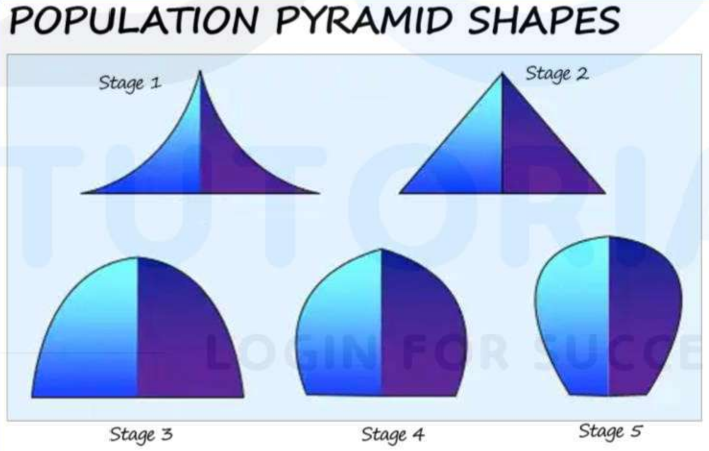

POPULATION PYRAMID SHAPES
Stage 1
Stage 2
Stage 3
Stage 4
Stage 5

Fig: 2

- In India demographic gap is of stage 3

Demographic transition 00:11:00

- Demographic transition: It is a phenomenon and theory which refers to the historical shift from high birth rates and high infant death rates in societies with minimal technology, education and economic development, to low birth rates and low death rates in societies with advanced technology, education and economic development.
- Change from high birth rate and death rate to a low birth rate & death rate.

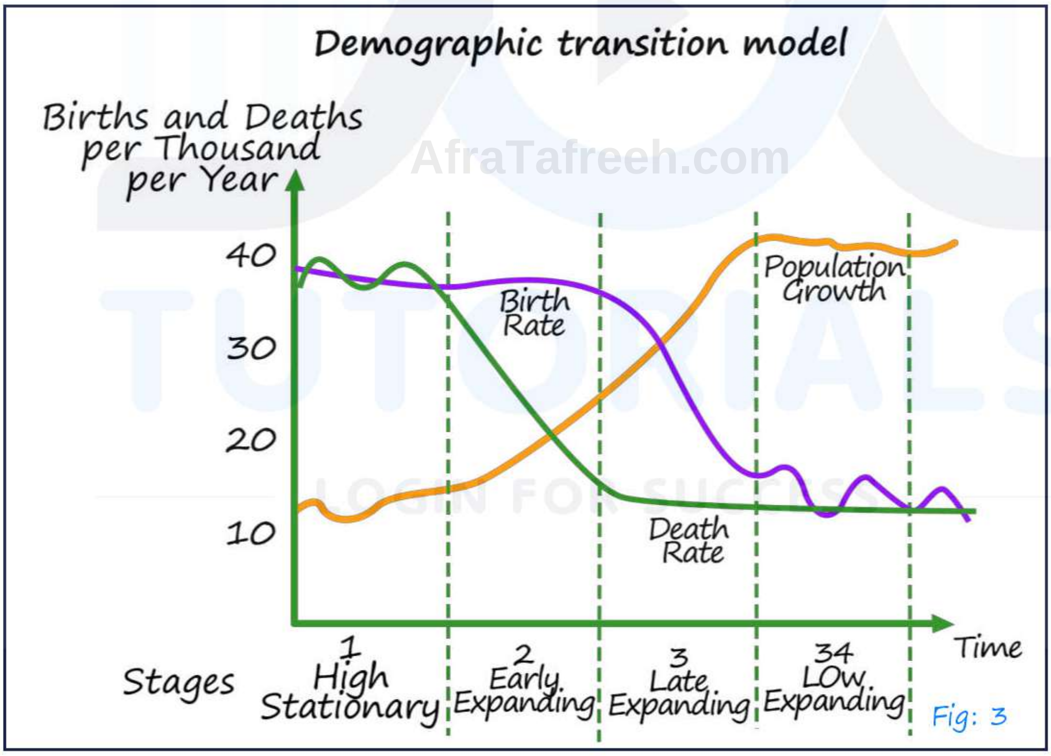


Fig: 3

Terms relating to increase in "working age group"

i. Demographic window of opportunity - new opportunities (that period of time in a nation's demographic evolution when the proportion of population of working age group is particularly prominent. This occurs when the demographic architecture of a population becomes younger and the percentage of people able to work reaches its height.)

ii. Demographic dividend – Increases economy (as the young Indian population enters the working age, it will lead to higher economic growth – a demographic dividend.)

iii. Demographic gift → All the positive effects of working age group

iv. Demographic trap → **Negative** effects of increase in elderly population (It is described as the combination of high fertility (birth rates) and declining mortality (death rates) in developing countries, resulting in a period of high population growth rate)

- Based on Dependency ratio, they are:

Demographic bonus – When **young age dependency ratio** decreases due to decrease in fertility.

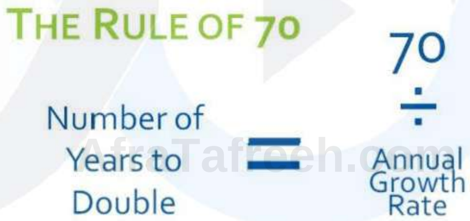
Demographic burden – increases **old age dependency ratio.**

Year of Big divide in Indian demography 00:15:00

- **1921** is known as year of big divide in Indian demography because, in this year it changed from stage 1 to stage 2 (from high stationary to early expanding)

Rule of 70 00:16:26

- The rule of 70 is a way to estimate the time it takes to double a number based on its growth rate.
- The result is the number of years required to double.



- $$\frac{70}{\%\text{ annual growth rate}} = \text{Doubling time}$$
- Doubling time is **when the population doubles**
- $$\frac{70}{\text{Doubling time}} = \%\text{ AGR}$$
- AGR of India – **1.64% per year**
- Population of India will double by

$$\frac{70}{1.64} = 42.68$$

$$\text{AGR} = \frac{70}{42.68} = 1.64\%$$

- AGR < 0.5 → Slow growth
- AGR 0.5 -1 → moderate growth
- AGR – 1-1.5 → Rapid growth
- AGR – 1.5 -2 → Very rapid growth
- **AGR – > 2 → Explosive growth**

The rule of 70

- 0.7% growth rate = double in 100 years
- 1% growth rate = double in 70 years
- 2% growth rate = double in 35 years
- 4% growth rate = double in 17.5 years.

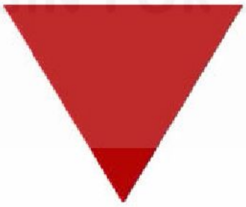
INTRODUCTION TO FAMILY PLANNING

Introduction 00:01:29

- India is the first country to introduce family planning as a part of the national programme
- Concept of the family planning was first introduced by Raghunath Dhondo Karve in 1921 (Big divide)

Fig: 1

- In 1952, family planning was introduced as a National programme in INDIA



EARLIER LOGO OF THE FAMILY PLANNING PROGRAMME Fig: 2

- Main Aim is sterilisation
- Later, the name was changed to Family Welfare Programme in 1977 and it became voluntary.

Scope: -

1.Spacing of Children

2.Marriage Counselling

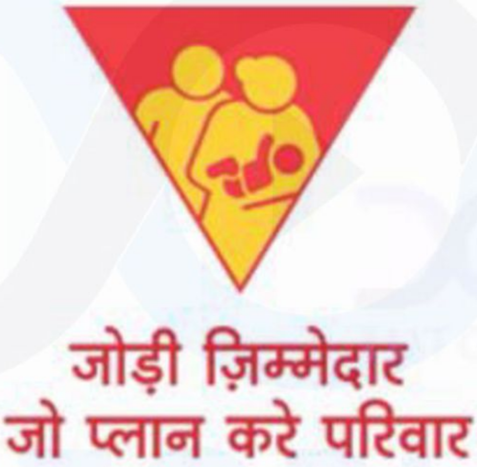
3.Education On Parenthood

4.Advice on sterility

5.Adoption services

6.Cervical cancer screening

7.Teaching home economics & nutrition


जोड़ी ज़िम्मेदार
जो प्लान करे परिवार

Logo of family welfare programme

NATIONAL HEALTH MISSION
NATIONAL
FAMILY PLANNING
SUMMIT
New Choices, New Horizons
ज़िम्मेदारी निभाओ
प्लान बनाओ
Family Planning Division
Ministry of Health & Family Welfare
Government of India

Fig: 3

Mainly divided into

1. Temporary methods
2. permanent methods

1.Temporary | spacing Methods

Fig: 1

- Barrier methods
  - Physical
  - Chemical
  - combined
    - Intra uterine devices
    - Hormonal methods
    - post conceptional
    - Miscellaneous

2.Permanent (or) Terminal methods

1. Male Sterilisation → vasectomy
2. female sterilisation → tubectomy

TUTORIALS LOGIN FOR SUCCESS

BARRIER METHODS

- Contraceptive methods are preventive methods to help women avoid unwanted pregnancies. They include all temporary and permanent measures to prevent pregnancy resulting from coitus.
- The contraceptive methods may be broadly grouped into two classes - spacing methods and terminal methods.
- Spacing methods: Barrier, IUCD, Hormonal, Post-contraceptional methods and miscellaneous.
- Terminal Methods: Male, female sterilization

Barrier methods are divided into 00:00:14

- Physical type
- Chemical type
- Combined type

Physical methods 00:00:26

1. Male condom
2. Female condom
3. Diaphragm
4. Vaginal sponge
    - MOA- it acts as a barrier preventing the fusion of sperm and ovum.

- Worlds first condom was made from the **gut of animals** and it was invented by Dr. Condom

ADVANTAGES of condom:

(a) they are easily available (b) safe and inexpensive (c) easy to use; do not require medical supervision (d) no side effects (e) light, compact and disposable, and (f) provides protection not only against pregnancy but also against STD

DISADVANTAGES: (a) it may slip off or tear during coitus due to incorrect use, and (b) interferes with sex sensation locally.

Fig: 1

- 3 Indian boys from UK invented condoms that can **detect STD by changing color**. These condoms are smeared by the antibodies of various STD and when they come in contact with antigen, the condom glows and emits light. Basis on the Colour of light, type of STD is known. The manual contains the color codes.

Female condom Fig: 2

- It has an outer rim and an inner rim. The inner rim is closed and the outer rim is open.

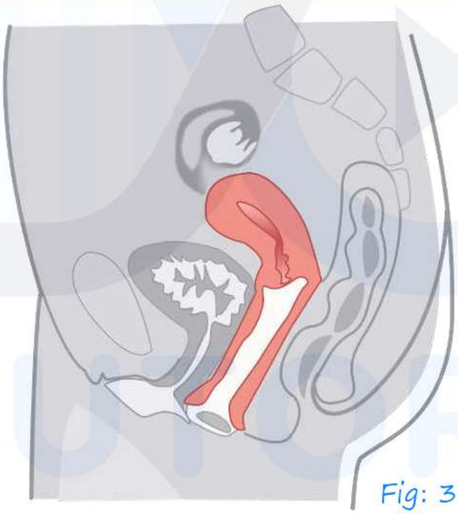


Fig: 3

- All these condoms can prevent STD's and pelvic inflammatory diseases. They are protective against Carcinoma Cervix

Diaphragm **Dutch cap**

Fig: 4

- Spermicide is kept inside the concavity and this can be pushed through the vagina.

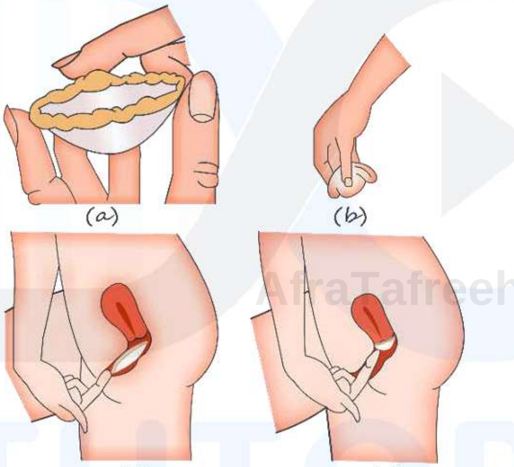
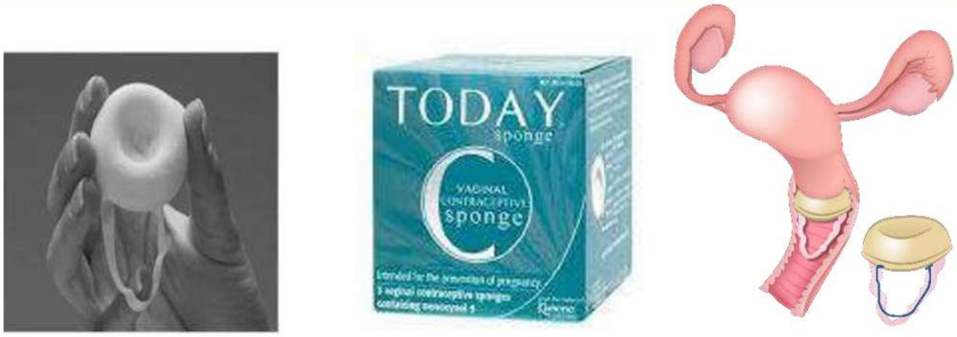


Fig: 5

- The diaphragm should be kept for **6hrs following intercourse**.

Disadvantages

- If diaphragm is kept inside for more than 12hrs it may cause **TSS** (toxic shock syndrome)
- Diaphragm cannot be used in:
  i. Prolapse of rectum
  ii. Cystocele



Vaginal sponge

Fig: 6

- **Nonoxynol 9 (1000mg**) is the chemical present in the vaginal sponge.
- Insertion of nonoxynol:
  - 1st run the vaginal sponge under water, then push it through the vagina with the loop hanging downwards for easy removal by pulling out. If left inside, vaginal sponge can cause **TSS.**
  - **Spermicide** can be used with vaginal sponge as well as diaphragm. So, these come under both physical barriers as well as combined methods.

Chemical methods: 00:07:22

- These are called as **spermicides**

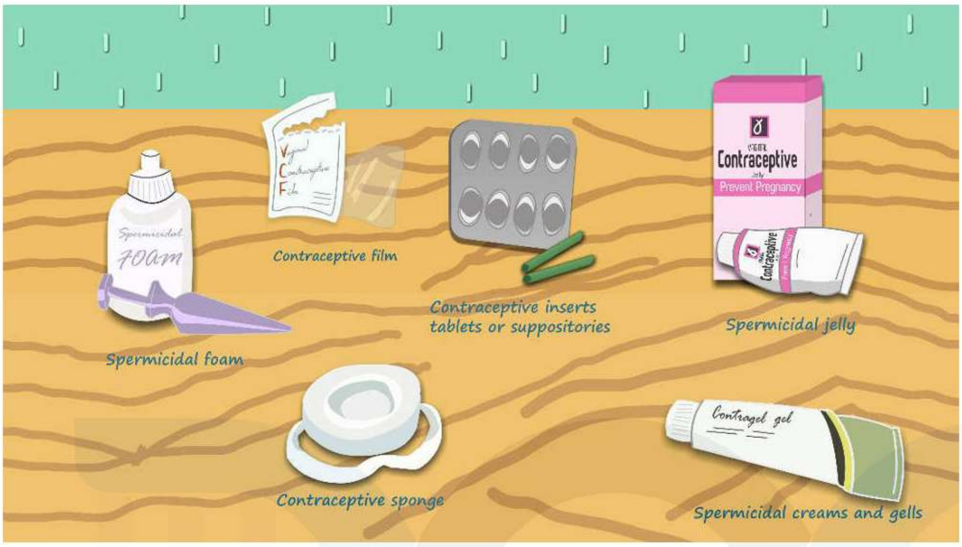

Spermicidal Foam
Spermicidal foam
Vaginal Contraceptive Film
Contraceptive film
Contraceptive inserts tablets or suppositories
Contraceptive Jelly Prevent Pregnancy
Spermicidal jelly
Contraceptive sponge
Contragel gel
Spermicidal creams and gells

Fig: 7

Spermicides are of 4 categories:

a) Foams: foam tablets, foam aerosols

b) Creams, jellies and pastes – squeezed from a tube

c) Suppositories – inserted manually, and

d) Soluble films – C-film inserted manually.

MOA of spermicide: it has got surfactant property; the moment it sees a sperm it attaches to it and forms a layer over it there by, cutting the oxygen supply to the sperm and kills it.

Combined Method

i. Cervical Sponge

ii. Diaphragm.

INTRA UTERINE CONTRACEPTIVE DEVICES

There are two basic types of IUD: non-medicated and Medicated.

- There are 3 generations.
  - 1st generation → inert
  - 2nd generation → copper medicated
  - 3rd generation → hormone
  - 4th generation

Mechanism of action – Foreign body reaction

i. Cu → endometrium changes

Decreases mobility of sperms

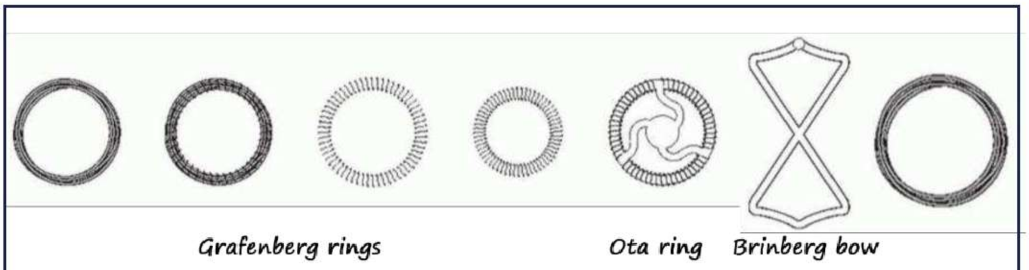
ii. Hormones → increases cervical mucus thickness

1st generation 00:02:05

i. Lippe's loop (obsolete)

Fig: 1

ii. Grafenberg's ring


Grafenberg rings
Ota ring
Brinberg bow

Both are obsoleted now. Fig: 2

2^{nd} generation 00:02:46

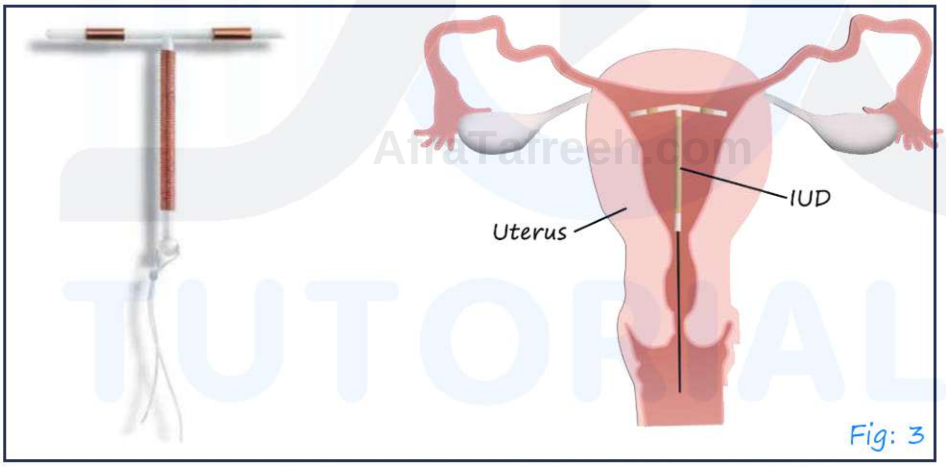


Fig: 3

- Copper – T 7
- Cut 220-B
- Cut-200
- Cut – 220C
- Nova- T
- Multiload – 250
- Cut 380A (paragard)
- Advantages of copper devices

- Low expulsion rate
- Lower incidence of side-effects, e.g., pain and Bleeding easier to fit even in nulliparous women better tolerated by nullipara increased contraceptive effectiveness effective as post-coital contraceptives, if inserted within 3-5 days of unprotected intercourse

3rd generation 00:03:28

- Hormone devices

Fig: 4

- Progestasert
- LNG – 20 (mirena)

TUTORIALS
JOIN FOR SUCCESS

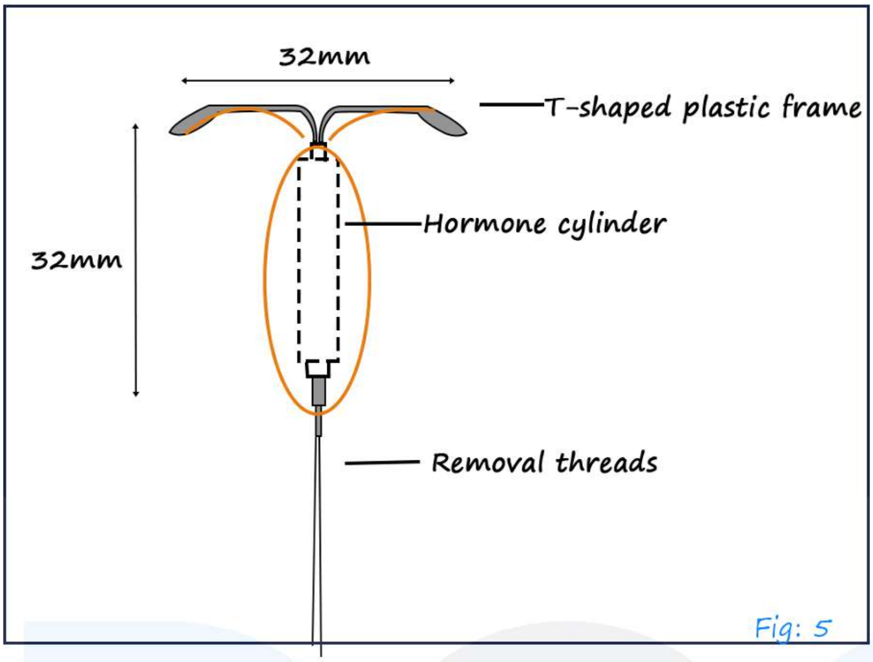

32mm
T-shaped plastic frame
32mm
Hormone cylinder
Removal threads

Fig: 5

4th generation 00:04:11

- Frameless
- No plastic body (less foreign body reaction → less chances of expulsion)
- Two devices of 4th generation are:
- Copper alone – gynefix copper
- Copper + hormone – fibro plant levonorgestrel (emits 14mcg levonorgestrel/day.)

TUTORIALS
LEARN FOR SUCCESS

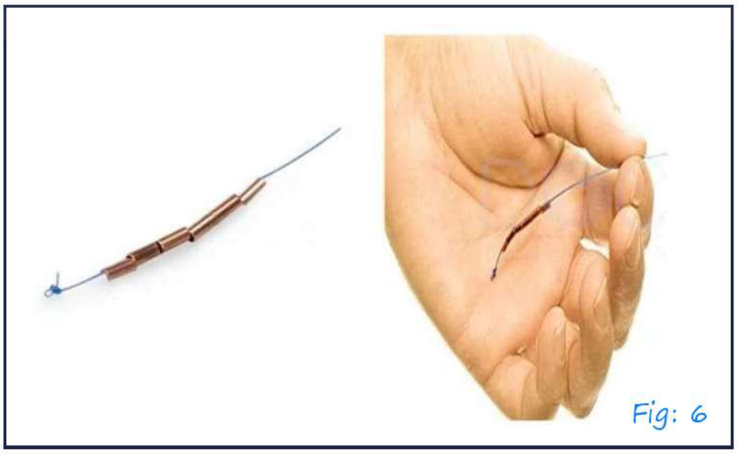


Fig: 6

Fig: 7

- Earlier devices
  - Cappen – 7
  - Cappen T – 200
- Newer devices
  - Variants of T device

    i. Cut – 220c

    ii. Cut – 380 A an Ag
  - Nova T
- Multi load devices:

  i. ML – Cu – 250

  ii. ML – Cu 375
  - The number included in the names of the devices refer to the surface area (in sq.mm) of the copper.

TUTORIALS LOGIN FOR SUCCESS

Life span 00:06:27

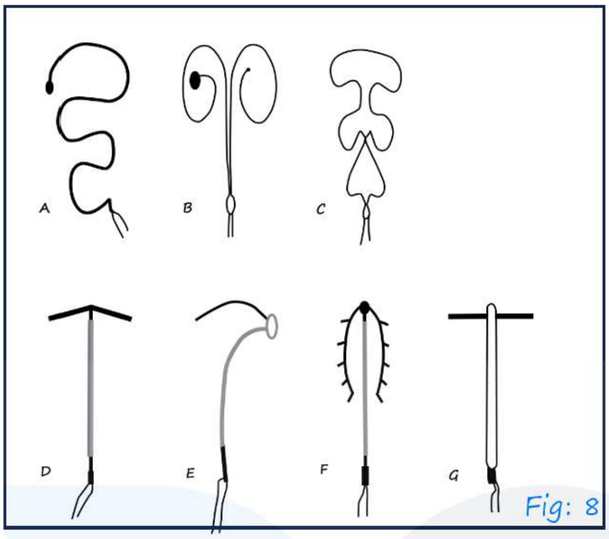


Fig: 8

- Progestasert – 1 year
- Mirena – 7 to 10 years
- Tcu 380A – 10 years
- Tcu 375 – 5 years
- Nova T – 5 years
- **Lowest expulsion & removal rate → Progestasert**
- 7, 220, 380 → numbers denote surface area of Cu mm^2
- B in CuT 220B → denotes size of IUD (A is smallest and D is largest)
- A in CuT 380A → silver or gold in IUD

- Ideal candidate who can use Copper T:
  - Normal menstrual periods
  - Monogamous relation
  - At least one child (because it may lead to infertility)

- No history of pelvic ds
- Willing to check IUD without fail
- Access to follow up
- has access to follow-up and treatment of potential problems

Timing of IUD 00:09:56

- Best→During or within 6 days of menstruation.
- Immediately or within 1-week post-partum.
- 6-8 weeks after delivery
- m/c side effect – Bleeding
- m/c cause of removal of IUD – pain
- Advantages of IUCD:
  - a. simple
  - b. insertion takes only a few minutes
  - c. once inserted IUD stays in place as long as required
  - d. inexpensive
  - e. contraceptive effect is reversible
  - f. virtually free of systemic metabolic side-effects
  - g. highest continuation rate
  - h. there is no need for the continual motivation required

- Contraindications
- ABSOLUTE: (a) suspected pregnancy (b) pelvic inflammatory disease (c) vaginal bleeding of undiagnosed aetiology (d) cancer of the cervix, uterus

or adnexia and other pelvic tumours (e) previous ectopic pregnancy.

- RELATIVE: (a) anaemia (b) menorrhagia (c) history of PID since last pregnancy (d) purulent cervical discharge (e) distortions of the uterine cavity due to congenital malformations, fibroids (f) unmotivated person
- Side effects/ Complications:
- Bleeding, pain, pelvic infection, uterine perforation, pregnancy, ectopic pregnancy, expulsion, fertility after removal, cancer & teratogenesis, mortality

HORMONAL METHODS

Hormonal contraceptives most effective method. Classified as : Oral pills and depot (slow release) formulations.

- They are of 3 types
  i. Oral
  ii. Injectables
  iii. Implants

I. Oral: 00:00:38

Oral contraceptive pills-

- Mechanism of action
  i. Prevent release of ovum from ovary.
  ii. It also blocks the pituitary secretion of gonadotropins which are responsible for ovulation.
- They are of 2 types
  i. Mala-D- **Levnorgestrel 0.15mg**
  ii. Mala-N- **Ethinyl Estradiol 0.03mg**

DOC TUTORIALS LOGIN FOR SUCCESS

Levonorgestrel and Ethinyloestradiol Tablets I.P.
with Ferrous Fumarate Tablets I.P.
माला.डी
Mala.D
CONTRACEPTIVE PILLS
For oral use by women
Rx
माला·एन
Mala·N
CONTRACEPTIVE PILLS
for oral use by women
Free Supply
Not for Sale

Fig: 1

- Mala D → Levonorgestrel and Ethinyloestradiol with **ferrous Fumarate Tablets.**
- Mala N → levonorgestrel and Ethinyloestradiol Tablets with ferrous fumarate Tablets.
- 28 days-21 days hormonal tablets & 7 days- iron tablets.
- Mala-N is given through PHC's and CHC's for free of cost
- Mala-D is to be bought from shops at a subsidised rate, price of Rs. 3 per packet.

- New ultra-low dose OCP
  - Ethinyl estradiol: 20mcg
  - Desogestrel: 150mcg

- Once a month pill it contains **quinestrol** + short acting progestogen.
- Male pill
  - Gossypol- obtained from cotton seed oil.
  - MOA- causes azoospermia

Non hormonal pills 00:05:12

- Centchromen - SAHELI
- It is synthetic and non-hormonal
- Centchroman is a birth control pill. It acts by preventing the implantation of the fertilized ovum to the womb (uterus)
- Produced from central drug research institute - Lucknow
- Chemical present is **ormeloxifen**
- MOA-Selective estrogen receptor modifier (SERM), it decreases oestrogen concentration, (Contraindicated in PCOD)
- Schedule: Twice weekly for first 3 months followed by a weekly dose thereafter.
- Also known as "**once a week pill**"
- Can be used as an anti-Breast cancer agent.
- It is now called **Chhaya**.

CENTCHROMAN TABLETS I.P.
8 Tablets
CENTCHROMAN TABLETS I.P.
Non-Steroidal Oral Contraceptive Pills
Chhaya
*Twice a week for first 3 months
*Once a Week after 3 months
Government of India
FREE SUPPLY, Not for Sale

Fig: 2

Hormonal injectables 00:08:54

- Mainly 2 hormonal injectables are present:
  i. DMPA- (depot medroxy progesterone acetate)
  ii. NET-EN- (Norethisterone Enanthate)
- Both are **progesterone only** injectables.
- Both are to be used **within first 5 days of menstrual period**

DMPA- It contains 150mg given IM every 3 months

NET-EN- 200mg given IM every 2 months

DMPA-SC 104mg- A new lower-dose formulation of DMPA, depo-subQ prouera 104 (also called DMPA-SC). is injected under the skin rather than in the muscle.

DMPA-SC is given at 3-month intervals.

Combined injectable contraceptives 00:10:50

- They are **cyclofem/ cycloprovera** and **mesigyna** & they contain both oestrogen as well as progesterone.
- Schedule: Administered as IM every month.

Cyclofémina
Medroxiprogesterona/Estradiol
MESIGYNA

Fig: 3

- The name of DMPA has been changed to **Antara (NEW)**

Antara
Medroxyprogesterone Injection I.P. 150mg/ml
Contraceptive Injection
अंतरा
150 mg/ml

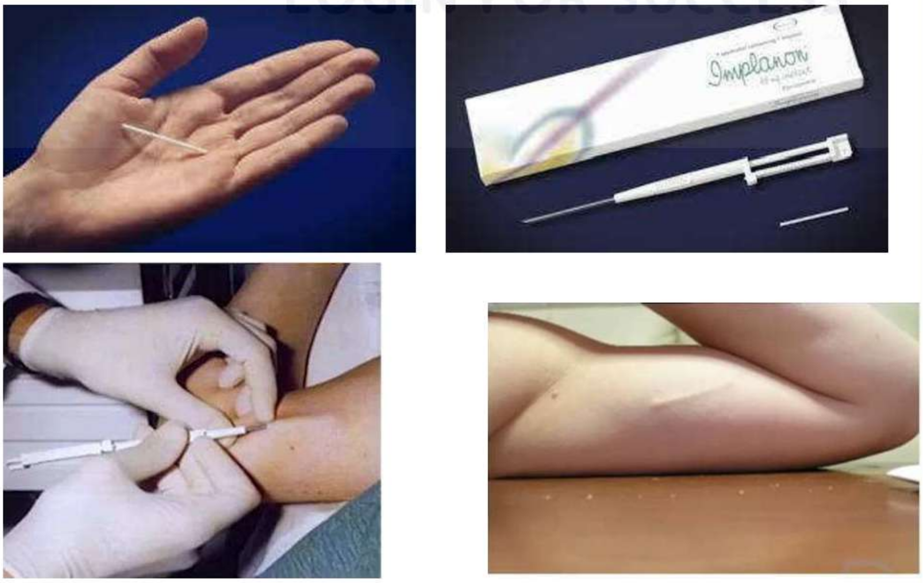
Fig: 4

IMPLANTS 00:12:12

Fig: 4

NORPLANT

- It is kept under the skin of your upper arm and arranged like the petals of a flower.
- It is palpable under skin
- It has **6 silastic (Silicone + plastic) capsules.**
- Each containing **35mg of Levonorgestrel (LNG)**
- Effective for **5 years**
- Norplant-II (2nd generation) **has 2 capsules** each containing **75mg of LNG** in each.



Implanon insertion

Fig: 5

IMPLANON

Fig: 6

Implanon removal Fig: 7

- It contains **Etonorgestrel**
- It is inserted under the skin
- Effective for **3 years.**
- It is available along with an applicator
- Oral abortifacients – **Mifepristone (Ru 486) + Misoprostol**

EMERGENCY CONTRACEPTIVES

- Emergency contraception refers to methods of contraception that can be used to prevent pregnancy after sexual intercourse.
- These are recommended for use within 5 days but are more effective the sooner they are used after the act of intercourse.
- It prevents pregnancy by preventing or delaying ovulation and they do not induce an abortion.
- The copper-bearing IUD prevents fertilization by causing a chemical change in sperm and egg before they meet.
- It should be taken within **72 hours of coitus.**
- Methods of Emergency contraception

  i. Yuzpe and lance method

  ii. Mini pills

  iii. High dose oestrogen

  iv. Antiprogestogen (mifepristone RU 486)

  v. IUD insertion

i. Yuzpee and lance method 00:01:13

- For OCP.
- **4 pills + 4 pills**
- 4 pills immediately → another 4 pills 12 hours later.
- Whole regimen is to be completed within 72 hours

ii. Mini pills: 00:01:58

- Also known as POP i.e. **progesterone only pills / E pills / EC pills**

2 tablets in one strip: –

- It is **0.75mg** taken immediately followed by another **0.75 mg of levonorgestrel** and the whole regimen is to be completed in 72hrs

i-pill
Emergency Contraceptive Pill
Piramal Healthcare
India's No. 1 Emergency Contraceptive Pill
Levonorgestrel Tablet

Fig: 1

- New pill has 1.5mg levonorgestrel (Only one pill)

Plan B One-Step
levonorgestrel tablet 1.5mg
Emergency Contraceptive
One Tablet One Dose

Fig: 1

iii. High dose Estrogen → **Estrogen 5mg OD × 5 days**

iv. Mifepristone (RU486)

- **1 tablet 10mg STAT within 72 hrs.**

v. IUD insertion: →

- Can be placed within **5 days**

> Mini pill is the drug of choice in emergency contraception.

POST CONCEPTION METHOD

Post Conception Method is 2 types

1.Menstrual regulation

2.Menstrual induction

1. Menstrual regulation 00:00:43

- It consists of aspiration of the uterine contents 6 to 14 days of a missed period, but before most pregnancy tests can accurately determine whether or not a woman is pregnant
- Applied when periods are missed by 1-2 weeks
- It is done using Karman's syringe

Fig: 1

- Advantages
  - OP procedure
  - Not an abortion (since we are not certain about pregnancy)
  - No legal restriction

2. Menstrual induction 00:02:33

- Inducing bleeding with **prostaglandin F_2**

Prostaglandin F_2

↓

Disturbing normal progesterone -prostaglandin balance by intrauterine application of 1-5 mg solution (or 2.5- 5 mg pellet) of prostaglandin F2.

↓

Sustained contraction of uterus in few minutes

↓

Cyclic contraction of uterus in 3-4 hours

↓

Bleeding starts & continues for 7-8 days

Additional point:

- Oral abortifacient: Mifepristone (RU 486) in combination with misoprostol is 95 per cent successful in terminating pregnancies of upto 9 week's duration with minimum complications.

MISCELLANEOUS METHODS

i. Abstinence

ii. Coitus interruptus

iii. Safe period

iv. Natural Methods

v. Breast feeding

vi. Birth control vaccine

i. Abstinence

- Sexual abstinence: It amounts to repression of a natural force and is liable to manifest itself in other directions such as temperamental changes and even nervous breakdown.

ii. Coitus Interruptus

- Withdrawing before ejaculation

iii. Safe Period

- Also known as calendar method /Rhythm
- Described by Ogino, based on the fact that ovulation occurs from 12 to 16 days before the onset of menstruation
- Calculation→

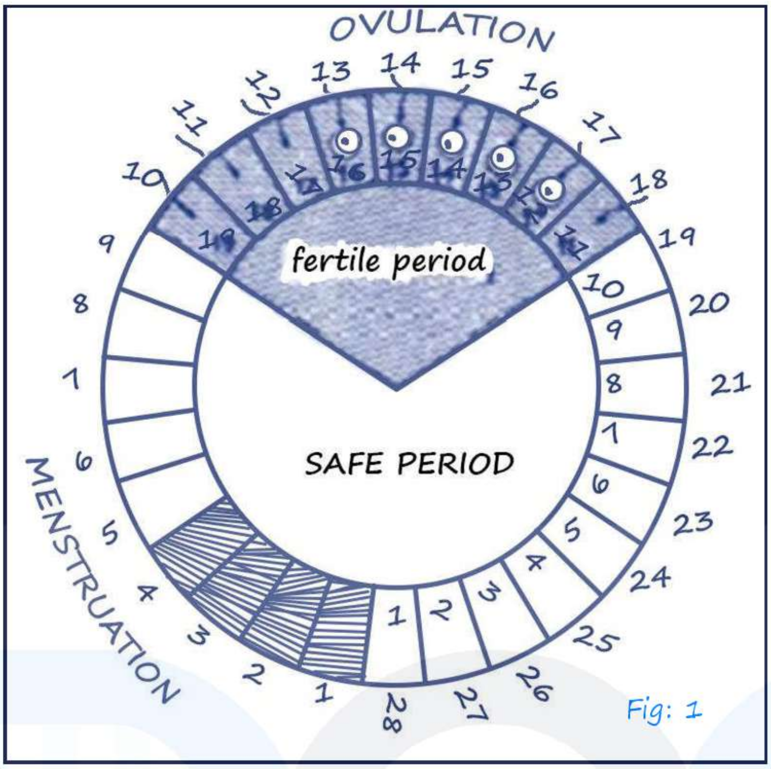
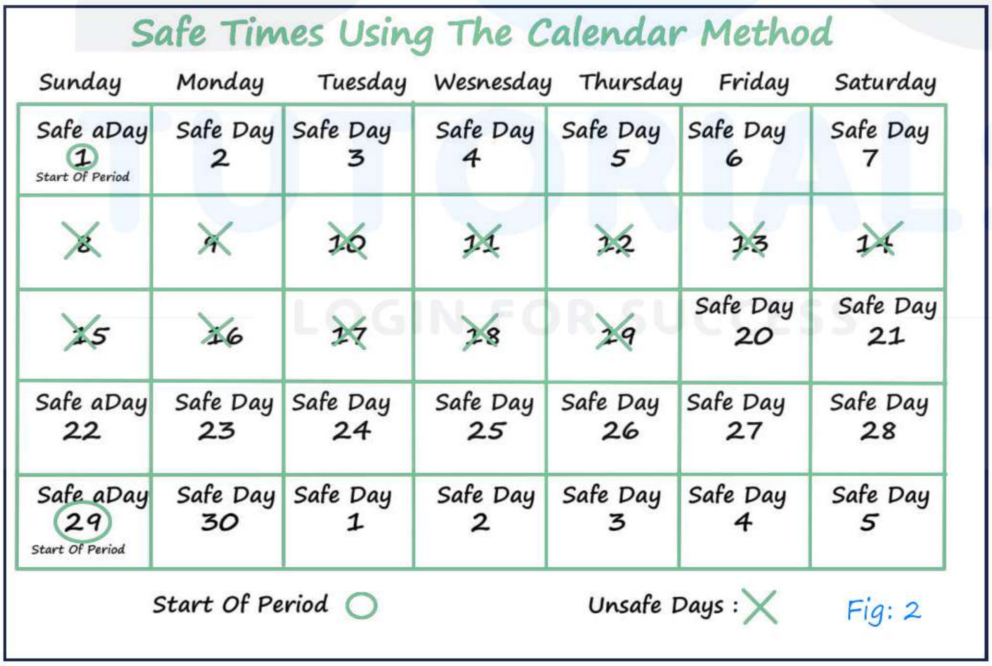

OVULATION
13 14 15 16
12 17
11 18
10 19
9 20
8 21
7 22
6 23
5 24
4 25
3 26
2 27
1 28
19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
fertile period
SAFE PERIOD
MENSTRUATION

Fig: 1

- Shortest cycle – 18 (First day of fertile period)
- Longest cycle – 10 (Last day of fertile period)



Safe Times Using The Calendar Method

Sunday	Monday	Tuesday	Wesnesday	Thursday	Friday	Saturday
Safe aDay 1 Start Of Period	Safe Day 2	Safe Day 3	Safe Day 4	Safe Day 5	Safe Day 6	Safe Day 7
~~8~~	~~9~~	~~10~~	~~11~~	~~12~~	~~13~~	~~14~~
~~15~~	~~16~~	~~17~~	~~18~~	~~19~~	Safe Day 20	Safe Day 21
Safe aDay 22	Safe Day 23	Safe Day 24	Safe Day 25	Safe Day 26	Safe Day 27	Safe Day 28
Safe aDay 29 Start Of Period	Safe Day 30	Safe Day 1	Safe Day 2	Safe Day 3	Safe Day 4	Safe Day 5

Start Of Period ○ Unsafe Days : ✕

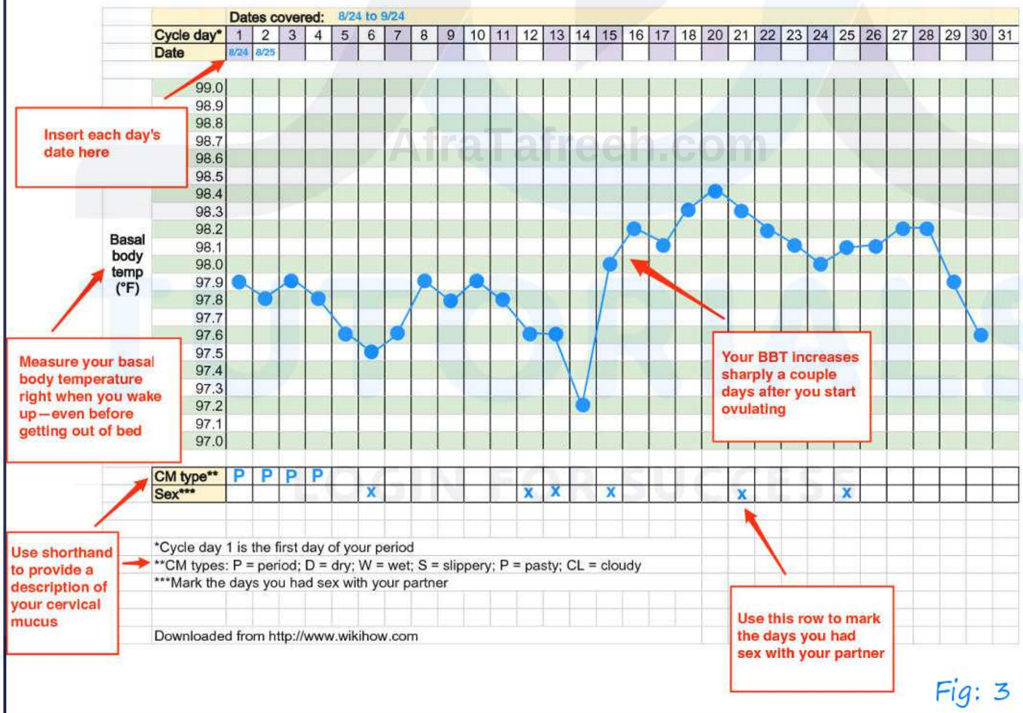
Fig: 2

- Drawbacks
  - Difficult to predict as woman's menstrual cycles are not always regular.

- Programmed sex (Abstain for one half of a month)
- More chances of **ectopic pregnancy** & embryonic abnormalities
- Not applicable in post-natal period
- More failure rate of 9/HWY

iv. Natural Methods

- Physiological signs & symptoms of **ovulation** are used as contraception.
- **Basal body temperature method** (BBT)→ at the time of ovulation, there will be increase in body Metabolism and change in basal body temperature



Insert each day's date here

Measure your basal body temperature right when you wake up—even before getting out of bed

Your BBT increases sharply a couple days after you start ovulating

Use shorthand to provide a description of your cervical mucus

Use this row to mark the days you had sex with your partner

*Cycle day 1 is the first day of your period
**CM types: P = period; D = dry; W = wet; S = slippery; P = pasty; CL = cloudy
***Mark the days you had sex with your partner

Downloaded from http://www.wikihow.com

Fig: 3

- **Cervical mucus method** – thick with progesterone and thin with estrogen. (Billing's method)
- **Symptothermic method** – Basal body temperature + Calendar+ cervical mucous method

v. **Breast feeding** → due to lactational amenorrhea provides some degree of protection from pregnancy

vi. **Birth control vaccines**

a. Anti HCG vaccine – Against β HCG
  - Decreases β HCG →decreased Progesterone → known as **Interception**
  - **3 doses – 6 months apart** followed by booster dose every year

b. Anti-zona vaccine – against zona pellucida → adherence of ovum does not take place.

c. Anti-sperm vaccine – Acting against sperm, killing it

STERILIZATION METHOD

Sterilization 00:00:11

- Sterilization offers many advantages over other contraceptive methods.
- It is a one-time method: it does not require sustained motivation of the user for its effectiveness;
- Provides the most effective protection against pregnancy:
- The risk of complications is small if the procedure is
- Performed according to accepted medical standards
- It is most cost-effective.
- Permanent method
- In females: It is called as **tubectomy**

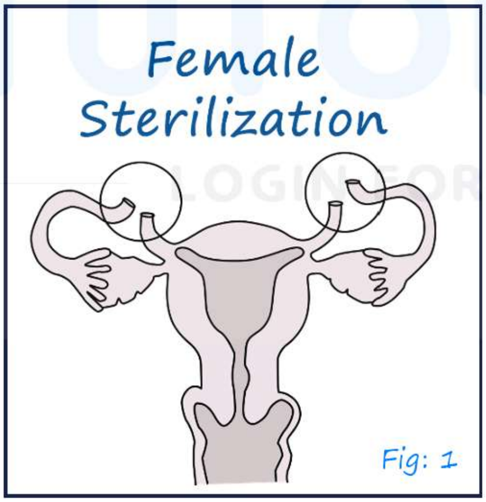


Fig: 1

- In males: It is called as **vasectomy**

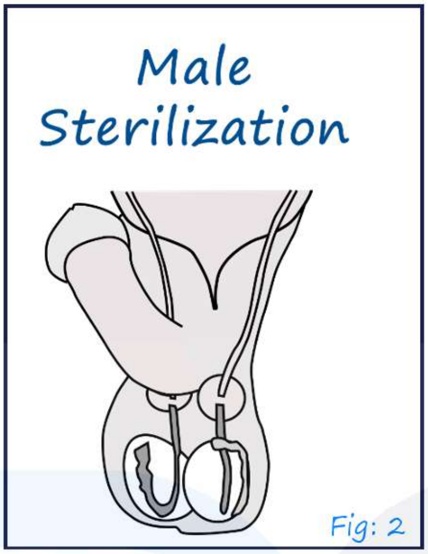


Fig: 2

Female sterilization Criteria 00:00:40

- Ever married.
- Age **22-49 years**
- **At least one child whose age is above one year**
- Spouse should not be sterilized in the past.
- Clients must be in a sound state of mind.
- Mentally in clients must be certified by a psychiatrist.

Male sterilization Criteria: 00:02:21

- Ever married.
- **22-60 yrs.**
- At least one child whose age is above one year.
- Spouse not sterilized in the past.
- Clients must be in a sound state of mind.

- Mentally ill clients must be certified by a psychiatrist.

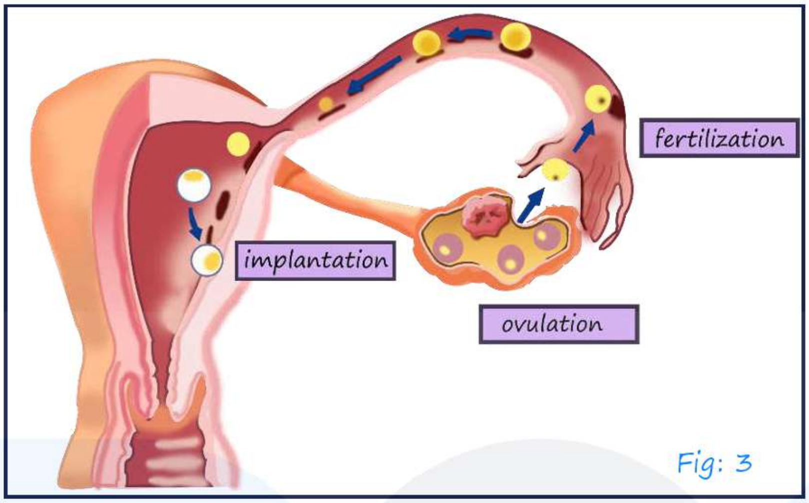
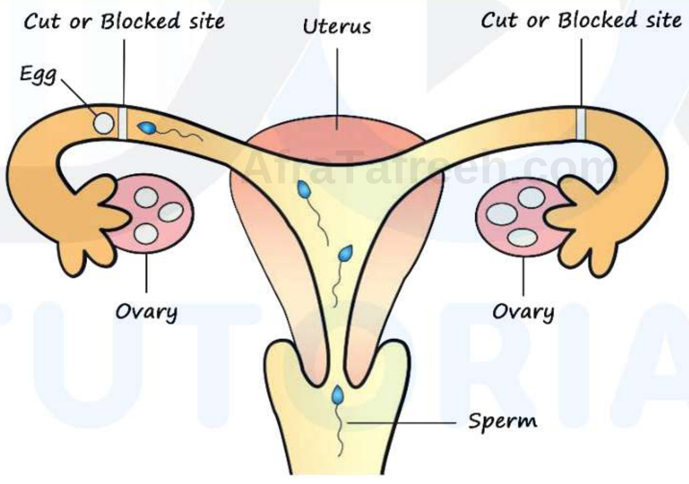

fertilization
implantation
ovulation

Fig: 3


Cut or Blocked site
Uterus
Cut or Blocked site
Egg
Ovary
Ovary
Sperm

Female Sterilization Fig: 4

AllaTafreeh.com
TUTORIALS
LOGIN FOR SUCCESS

POMEROY METHOD- It is one of the most frequent methods of tubal ligation surgery and is characterized by resection (or removal) of a portion of the fallopian tube.

Now a days the Fallopian tube is either clipped or band is used

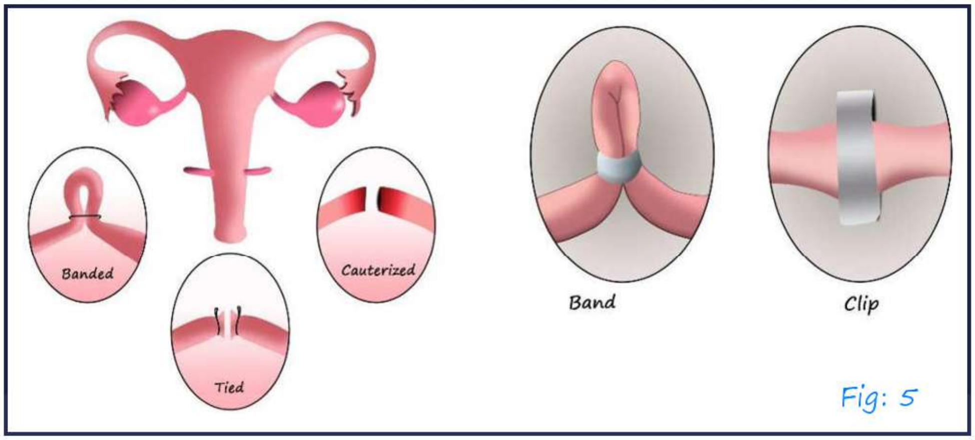

Banded
Tied
Cauterized
Band
Clip

Fig: 5

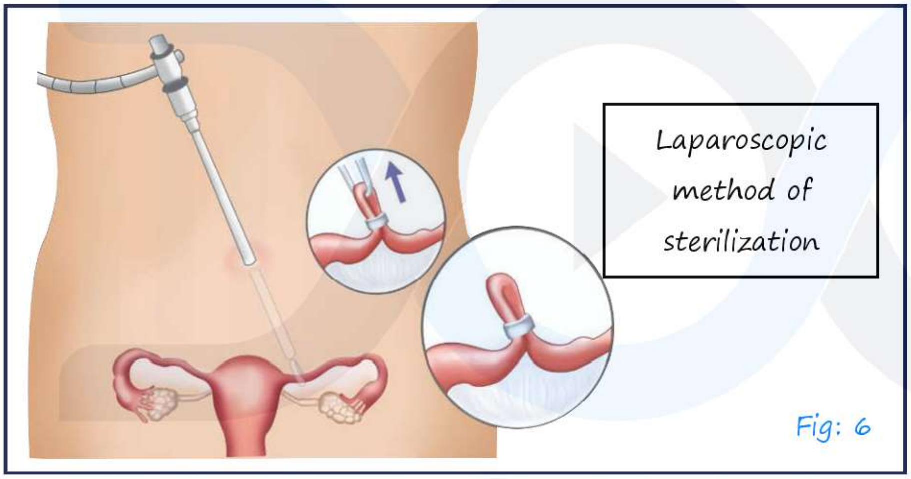

Laparoscopic method of sterilization

Fig: 6

Tubectomy:

- As the fertilization takes place in fallopian tube, 2-3 cm from it is cut.
- Pearl Index: for reporting the effectiveness of a birth control method.
- PI= Number of failures per 100-woman yrs. (HWY)
  - Failure rate per HWY = $\frac{\text{Total accidental pregnancy}}{\text{Total month of exposure}} \times 1200$
  - 1200, is the number of month is 100 yrs.

- There are two calculation methods for determining the Pearl Index:
- In the first method, the relative number of pregnancies in the study is divided by the number of months of exposure, and then multiplied by 1200.
- In the second method, the number of pregnancies in the study is divided by the number of menstrual cycles experienced by women in the study, and then multiplied by 1300.
- 1300 instead of 1200 is used on the basis that the length of the average menstrual cycle is 28 days, or 13 cycles per year.
- Most common type of **ectopic pregnancy – tubal pregnancy.**
- Most common **site- Ampulla.**

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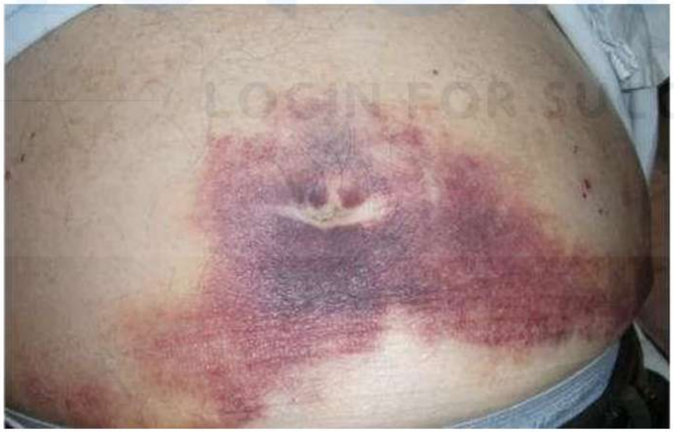
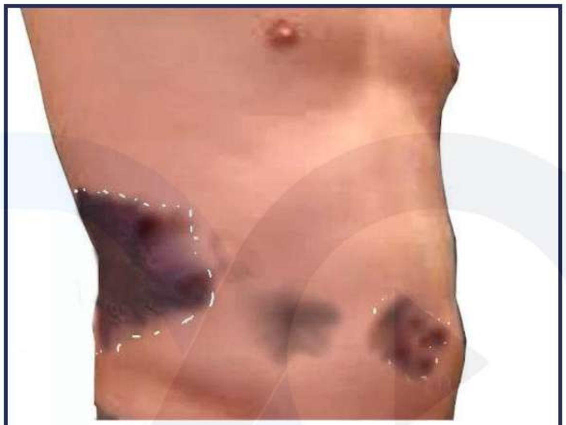


Fig: 8

Cullen's sign-seen in ruptured Ectopic

- Bruising and edema of the tissues around the umbilicus.
- Seen in **ruptured ectopic pregnancy** & **acute pancreatitis.**
- Due to **intra-abdominal bleed.**



Grey turner's sign Fig: 9

- Bruising of **flanks.**
- Seen in ruptured ectopic pregnancy & acute pancreatitis.
- Due to **retroperitoneal bleed.**

Easy way to remember:

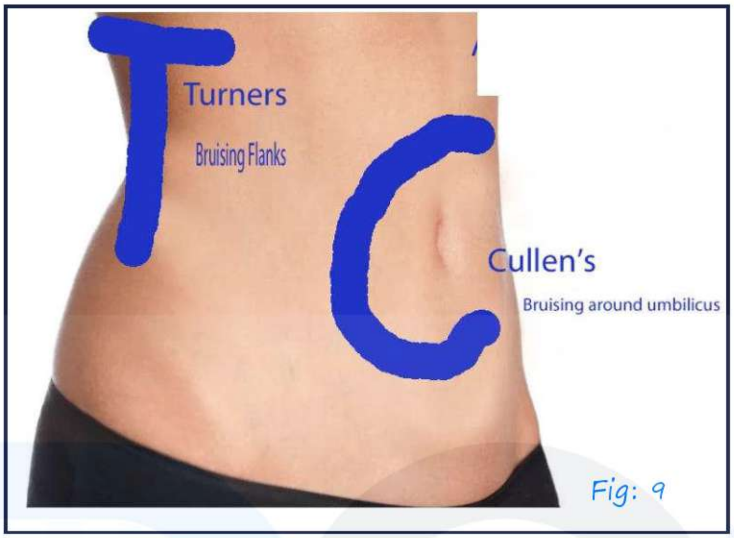
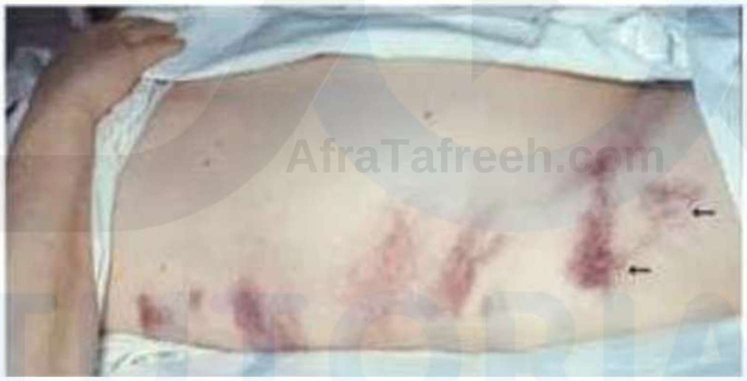

Turners
Bruising Flanks
Cullen's
Bruising around umbilicus

Fig: 9



Fox's sign Fig: 10

- Bruising around the **inguinal ligament.**

Ideal timing for female sterilization 00:07:00

- Post-partum → between 24 hrs. to 7 days of delivery
- Interval sterilization → within 7days of menstrual cycle.

Vasectomy: 00:08:10

- It is a form of male birth control that cuts the supply of sperm to your semen.
- It's done by cutting and sealing the tubes that carry sperm. Vasectomy has a low risk of problems and can usually be performed in an outpatient setting under local anesthesia

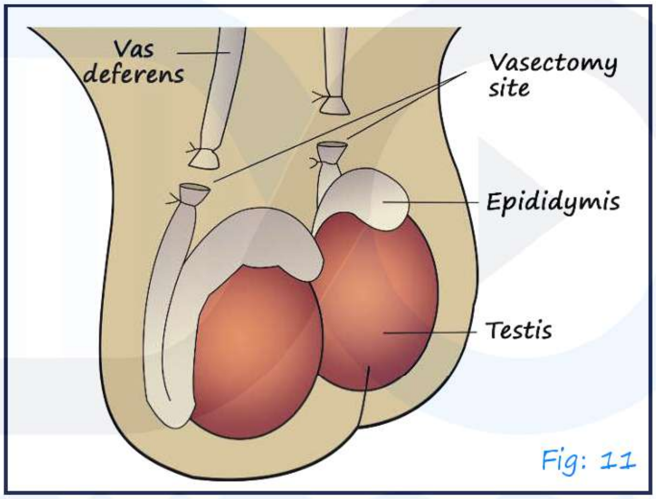


Fig: 11

- Removal of **1 cm** of vas deferens and ligating the ends

Advice to be given

- Normal activity – within 48hrs
- Cycling in 1 week
- Use T bandage – for 15 days
- **They are not sterile till 30 ejaculations**
- **Use other method of contraception for 3 months**

Very important

Sperm granule: 0009:38

- A sperm granuloma is a small mass or lump that may develop following a vasectomy. Essentially, the lump is an inflammation that is created by extravasated sperm.
- Granules of sperm getting accumulated at the testicular end of the cut vas deferens.
- 7mm size mass – **10-14 days after vasectomy.**
- This can act as channel for re-anastomosis of vas.
- Prevention of sperm granule is done by open ended vasectomy.

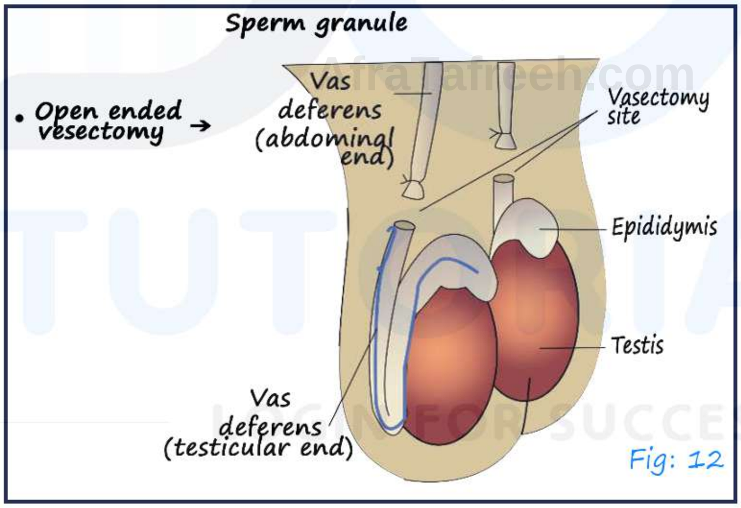

Sperm granule
• Open ended vesectomy →
Vas deferens (abdominal end)
Vasectomy site
Epididymis
Testis
Vas deferens (testicular end)

Fig: 12

No scalpel vasectomy (NSV): 00:11:10

- Recent advancement
- Also known as "Key Hole Vasectomy"
- With a no-scalpel vasectomy, the vas deferens are held with a clamp from outside the scrotum and a

needle is used to make a small hole in the scrotum for access to the ducts.

- It can also be done more quickly than a conventional vasectomy and requires no sutures to close up incisions.
- A no-scalpel vasectomy also means less pain and bleeding.

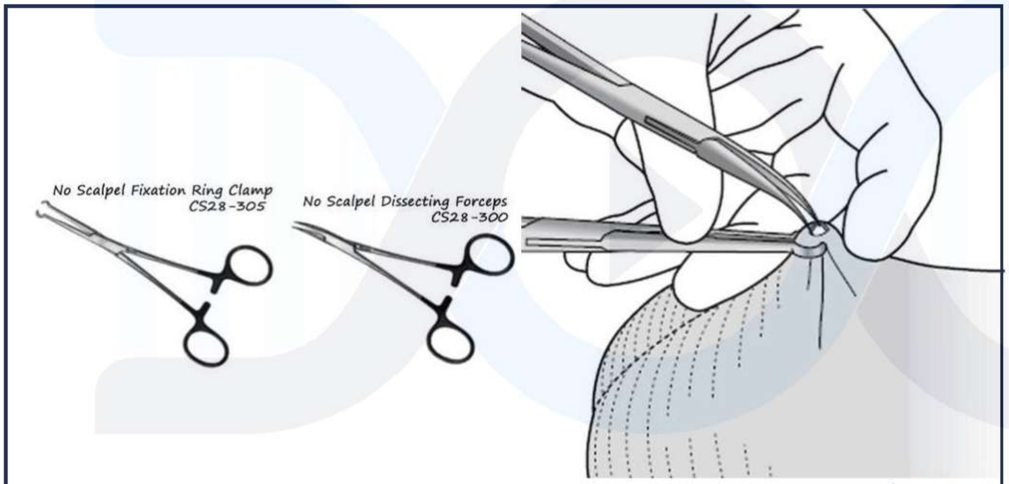

No Scalpel Fixation Ring Clamp
CS28-305
No Scalpel Dissecting Forceps
CS28-300

Fig: 13

- Most common cause for failure of vasectomy → wrong identification of vas deferens.

FAMILY PLANNING CLINICS AND SERVICES AT FIELD LEVEL

- Till recently, all sterilization services were given in a camp mode. Now, the government has fixed one particular day in the hospital. Where, the patients can utilize the family planning services.
- **Fixed day static sterilization services (FDS)**
- Guidelines for sterilization:

Health facility	**Minimum frequency**
District hospital	Week
Sub-district hospital	Week
CHC/Block PHC	Fortnightly
24x7 PHC/ PHC	Monthly

AfraTafreen.com

ASHA's charges- 00:02:36

Fig: 1

- Charges paid by the beneficiary to ASHA for delivering a:

  i. Pack of 3 condoms- 1rupee

  ii. Cycle of OCP- 1 rupee

  iii. Pack of 1 tab of Emergency Contraceptive Pill- 2 rupee

ASHA's Charges-Paid by The Government 00:04:21

- Rs 500/- to ASHA for ensuring spacing of 2 years after marriage.
- Rs 500/- to ASHA for ensuring spacing of 3 years after the birth of 1st child
- Rs 1000/- in case of permanent methods of sterilization.

Government Servants Benefits for Sterilization-

- Female sterilization- 14 days' special leave
- Male sterilization- 7days of special leave

NFPIS 00:06:00

- National Family Planning Indemnity Scheme: incentives for promoting the practice of family planning.
- The Government of India currently provides compensation for lost wages and expenditures to acceptors of sterilization and the IUD

- A compensation is paid by the government for those persons who undergo family planning services like sterilization and something goes wrong.
- Death at hospital/ within 7 days of discharge-Rs 2,00,000/-
- Death within 8-30 days from discharge-Rs 50,000/-
- Medical complication-Rs 25,000/-
- Failure of sterilization-Rs 30,000/-

Home delivery of Contraceptives (HDC)

i. A new scheme has been launched to utilize the services of ASHA to deliver contraceptives at the doorstep of beneficiaries. The scheme was launched in 233 pilot districts of 17 states on 11 July 2011 and is now expanded to the entire country from 17th December 2012.

ii. Under the scheme ASHA would do home delivery of the contraceptives ((Condoms, OCPs, ECPs)) at the doorstep of beneficiaries.

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MTP ACT

Medical Termination of Pregnancy (MTP)

MTP act mentions about the following:

- It was first formed in the year **1971**.
  1. Condition under which pregnancy can be terminated.
  2. Person who can perform termination
  3. Place where termination can be performed

---

5 conditions under which pregnancy can be terminated 00:00:50

---

a. Medical- if the pregnancy is a danger to the health of the mother

b. Eugenic-genetic abnormality effecting the health of the baby

c. Humanitarian- if the pregnancy is out of rape or incest

d. Socioeconomic conditions

e. Failure of contraceptive.

- The written consent of the guardian is necessary before performing abortion in women under 18 years of age, and in lunatics even if they are older than 18 years

DOC TUTORIALS LOGIN FOR SUCCESS

2. WHO CAN UNDERGO MTP? 00:02:25

a. If the duration of pregnancy is less than 12weeks of gestation, 1 registered medical practitioner (RMP) who's experienced in OBG can perform MTP.

b. If the pregnancy is of 12-20 weeks of gestation, 2 RMP's opinion must be taken

3. Where can you undergo MTP? 00:03:00

1. All government institutions approved for MTP
2. all private institutions which have affiliation or have got government permission. (District/Chief medical officer)

MTP (AMENDMENT) BILL,2020 00:04:00

NEXT IAS
Medical Termination of Pregnancy
(Amendment) Bill, 2020

Fig: 1

i. Any pregnancy **less than 20 weeks** requires one **1 medical registered practitioner**

ii. For **20-24 weeks pregnancy**, an opinion of **2 medical registered practitioners** is considered- Conditions under which one can undergo MTP during weeks 20-24 of gestation are:

   - It is only for special vulnerable groups.
   - These special vulnerable groups are defined as- **victims of rape, incest, differently abled, minors** etc.

iii. If a medical board diagnosed any **genetic abnormality** in the foetus, MTP can be done during **any** week of pregnancy.

iv. Privacy of the lady should be maintained.

COUPLE PROTECTION RATE (CPR)

- It shows the percent of eligible couples effectively protected against child birth by one or other approved methods of Family p lanning viz. Sterilization, condom, IUD or Oral pills.
- Eligible couple: is a married couple where **wife is in the reproductive age group** (i.e., 15-45/49years)
- In a population (usually per 1000 population) are **150-180 eligible couples** approximately.
- Target couple: families with one child or newly married couple are called as target couple. These are most important families are a target for family planning measures.
- NRR = 1 can be achieved only if the CPR > 60%

Couple Protection Rate (CPR)

- Formula:

$$\frac{\text{Eligible couples using family planning}}{\text{Total eligible couples}} \times 100$$

Effective couple protection rate:

- In this method, we also consider the **effectiveness** of family planning method is considered.
    - Condom is 50% effective
    - IUD is 95% effective
    - OCP is 100% effective

  - Sterilisation is 100% effective

- Suppose there are 1000 eligible couples and out of them 100 are using condoms, 100 using IUD, 100 using OCP & 100 underwent sterilisation; the CPR is as follows:
  - CPR 400/1000 x100 = 40%

$$\text{Effective CPR} = \frac{50+95+100+100}{1000} \times 100$$

$$= \frac{354}{10\cancel{00}} \times 1\cancel{00} = 34.5\%$$

- Crude Birth Rate (CBR) is defined as number of live births per 1000.
- Pregnancy wastage is usually taken as 10%
- As per the rule of 50, **50% of pregnancies would be registered with the ANM** (Auxillary Nurse mid-wife) at any given time.
- Unmet need for family planning is defined as the percentage of women of reproductive age, either married or in a union, who have an unmet need for family planning.
- Women with unmet need are those who are want to stop or delay childbearing but are not using any method of contraception.
- Unmet need for contraception up to 30 years → **SPACING** between pregnancies.
- Unmet need for contraception >30 years → **LIMITING** pregnancies.

CONTRACEPTIVE EFFICACY

- Defined as **number of unwanted pregnancies in spite of using a contraceptive**
- Efficacy of a contraceptive is Measured using 2 parameters:
  a. Pearl Index.
  b. Life table analysis.

Pearl index 00:01:30

- Pearl index is used for measuring the failure rate of a contraceptive.
- It is defined as the number of contraception failures per 100 women years (HWY) of exposure.
- The numerator "total accidental pregnancies" includes all unwanted pregnancies irrespective of the outcome, i.e.,
- Livebirth
- Abortion
- Stillbirth or
- Still not terminated
- The denominator "total months of exposure" is obtained by deduction of the following from the total period of review:
- 10 months for each full-term pregnancy
- 4 months for each abortion

- "1200" is the number of months in 100 years.
- A minimum of 600 months of exposure is necessary for obtaining a valid "failure rate" value.

Formula - $$\frac{\text{Total accidental pregnancy}}{\text{Total months of exposure}} \times 1200\ (12 \times 100)$$

- It it's based on menstrual cycle

$$\frac{\text{Total accidental pregnancy}}{\text{Total number of menstrual cycles}} \times 1300(13 \times 100)$$

- Number of accidental pregnancies in a life span = $\frac{\text{Pearl index}}{4}$

- 25 years is the usual reproductive span for Indian women.
- The drawback for pearl index is that it can only be calculated for 100 years. To overcome this, life table analysis is made.

TUTORIALS LOGIN FOR SUCCESS

Life table analysis 00:05:00

- 'Life table analysis' calculates cumulative failure rates over a specified timeframe.
- They present failure rate as number of pregnancies per 100 women years, standardized by yearly cut-off points (usually 1, 3 or 5y)

- E.g., "life-table rates for long-acting hormonal methods were reported as 0–0.6 per 100 HWY at one year"
- Calculate failure for each month
- Best measure is life table analysis
- Most commonly used is pearl index

INTRANATAL PEROID

INP & Definitions 00:00:23

- Intranatal period starts from onset of labour till delivery of placenta.
- The aims of good intranatal care are:

  1.thorough asepsis;

  2.delivery with minimum injury to the infant and mother;

  3.readiness to deal with complications such as prolonged labour, antepartum haemorrhage, convulsions, malpresentations, prolapse of the cord, etc.

  4.Care of the baby at delivery - resuscitation, care of the cord, care of the eyes. etc.

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Term delivery

- Defined as delivery at term i.e., **37 weeks – 42 weeks.**

Post term

- Defined as delivery after **42 weeks.**

Pre term

- Defined as delivery before 37 weeks.
  - Moderate to late preterm- 32 – 37 weeks.

- Very preterm – 28 – 32 weeks.
- Extremely preterm – <28 weeks.

Neonatal Tetanus 00:02:30

- Neonatal tetanus manifests if proper care is not taken.

5 Clean practices 00:03:15

- 5 Cleans to eliminate neonatal tetanus are as following:

  i. Clean delivery surface.

Fig: 1

  ii. Clean hands before touching the baby.

  iii. Clean cord cutting.

Fig: 2

iv. Clean cord tie.

v. Clean cord stump.

7Clean practices 00:06:30

- 7 cleans – 5 cleans + 2 cleans is now practiced.

vi. Clean water.

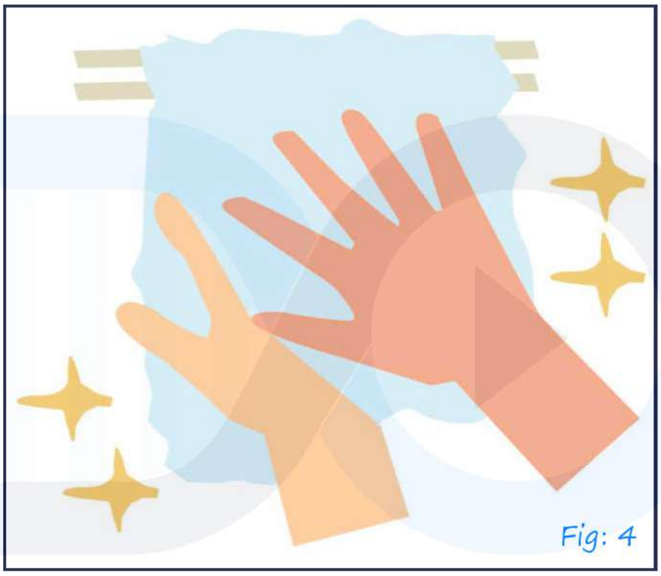

Fig: 4

vii. Clean towel

Disposable delivery kits 00:08:30

- **Disposable delivery kits** are given to all "dais" to ensure clean and safe delivery at home.

Medi Ster
DELIVERY KIT
NON TOXIC & PYROGEN FREE

Fig: 5

Institutional delivery rates as per NFHS 4 data

00:09:00

Institutional delivery

Fig: 6

- India – **78.9%.**
- **Kerala has got highest institutional delivery.**
- Kerala > Lakshadweep > Puducherry. → order of highest rate of institutional delivery which also coincides with the literacy rate in the area.
- **Nagaland** has least number of institutional deliveries i.e., **32.8%** approximately.

MCQs

00:10:00

The danger signals are:

1. sluggish pains or no pains after rupture of membranes;
2. good pains for an hour after rupture of membranes, but no progress;
3. prolapse of the cord or hand;

4. meconium-stained liquor or slow irregular/excessively fast foetal heart;
5. excessive 'show' or bleeding during labour;
6. collapse during labour;
7. a placenta not separated within half an hour after delivery.
8. post-partum haemorrhage or collapse; and
9. a temperature of 38 deg C or over during labour.

- Keeping the baby's crib by the side of the mother's bed is called "rooming-in".

BIRTH WEIGHT & APGAR SCORE

Post natal visits 00:00:13

- Minimum number of postnatal visits → 3 → on **3rd day, 7th day and 42nd day** after delivery. (If LBW or Pre mature baby 6 visits apart from normal 3, additional visits on days 14, 21 and 28 (as per the Integrated Management of Neonatal and Childhood Illness [IMNCI] guidelines)
- Complications of Postnatal period: Puerperal sepsis, secondary hemorrhage, Thrombophlebitis

Warm chain 00:00:58

- Immediately after delivery, the baby in at risk of **Hypothermia**. It can be prevented by warm chain.
- A warm chain is a system of keeping a baby warm immediately after delivery, wherever it occurs (at a health facility or the mother's home), during transportation and while feeding and caring for the baby.
- 10 strategies in warm chain hypothermia:
- "Mnemonic → **We Went In Summer But Brother And Mother Provided Water**"

  1.Warm delivery room.

  2.Warm resuscitation.

  3.Immediate drying.

4.Skin to Skin contact.

5.Breast feeding

6.Bathing postponed

7.Appropriate clothing

8.Mother and baby together

9.Professional alertness

10. Warm transportation

Birth Weight, Length & Chest Circumference 00:02:36

- Average birth weight of baby born in India – **2.8kg (2.7 – 2.9)**
- Birth weight
  - **doubles** by 5months
  - **triples** by 1year
  - **quadruples** by 2 years
- Hepatitis B is **not** given if the birth weight is < 2kg (as sufficient antibodies are not produced)
- Birth length is 50cm —> **doubles** by 4 years
- Chest circumference exceeds Head circumference by **9months – 1year**

LBW 00:05:15

- LBW infants were defined as those weighing <2500 grams at birth
- Low birth weight - < 2.5kg Internationally (<2kg – India)
- Very low birth weight - <1.5kg
- Extremely low birth weight - <1kg

Small for date baby 00:06:22

- Small for gestational age is a term used to describe babies who are smaller than number for the number of weeks of pregnancy.
- These babies have birth weight below the 10th percentile.
- This means they are smaller than many other babies of the same gestational age.
- Small for date babies –It can be term or preterm
  - High risk of death
  - Also called IUGR babies

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APGAR score 00:00:13

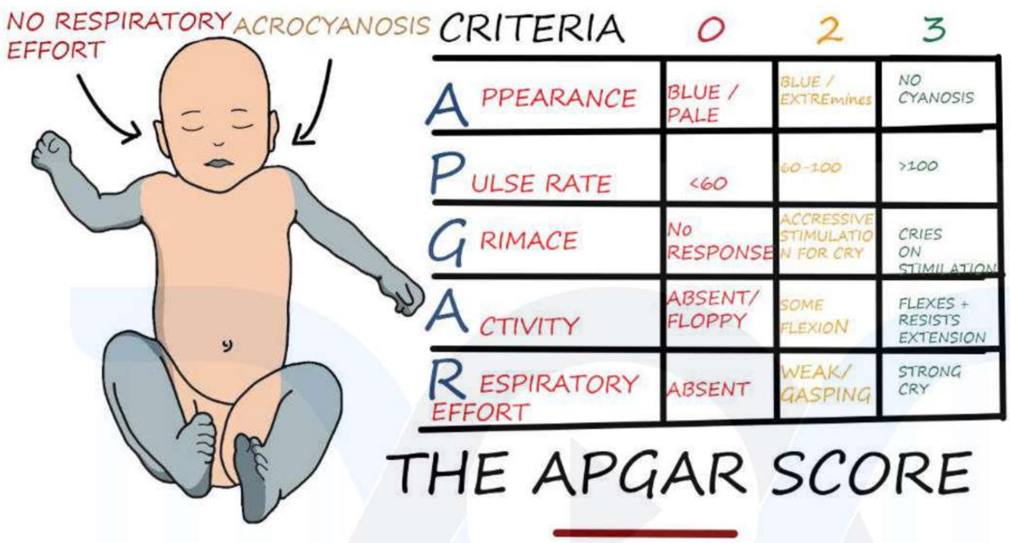
- Apgar is a quick test performed on a baby at 1 and 5 minutes after birth. The 1-minute score determines how well the baby tolerated the birthing process.
- The 5-minute score tells the health care provider how well the baby is doing outside the mother's womb.

Fig: 1

- Dr. Virginia Apgar
- APGAR Score

Sign					
	0	**1**	**2**	**1 min**	**5 min**
Heart Rate	Absent	Less than 100	Over 100	2	2
Respiratory	Absent	Slow irregular	Good cry	1	2
Muscle tone	Limp	Some flexion	Active motion	1	2
Reflex irritability	No response	Grimace	Cry	1	2
Color	Pale	Body pink	All pink	1	2

		extremity blue			
Total				**6**	**10**



CRITERIA	0	2	3
APPEARANCE	BLUE / PALE	BLUE / EXTREmines	NO CYANOSIS
PULSE RATE	<60	60-100	>100
GRIMACE	No RESPONSE	ACCRESSIVE STIMULATION FOR CRY	CRIES ON STIMILATION
ACTIVITY	ABSENT/ FLOPPY	SOME FLEXION	FLEXES + RESISTS EXTENSION
RESPIRATORY EFFORT	ABSENT	WEAK/ GASPING	STRONG CRY

THE APGAR SCORE

- Max score – 10
- Min score – 0
- Interpretation of APGAR score: 1
- 7-10 – No depression
- 4-6 – Moderate depression
- 1-3 – Severely depressed
- <5 - needs prompt action

BREAST FEEDING

Breast Feeding of Newborns 00:00:22

- Provision of mother's breast milk to infants within one hour of birth is referred to as "early initiation of breastfeeding" and ensures that the infant receives the colostrum, or "first milk", which is rich in protective factors.
  - Breast feeding should be started at the earliest
  - First formed milk is called as colostrum

Colostrum 00:00:40

- Colostrum is a milky fluid that's released by mammals that have recently given birth before breast milk production begins.
- Colostrum, a nutrient-rich fluid produced by female mammals immediately after giving birth, is loaded with immune, growth and tissue repair factors.
- It is a complex biological fluid, which helps in the development of immunity in the newborn

Colostrum

- First formed milk
- Colour – Yellow to orange
- Thick milk with high concentration of **proteins, carbohydrates and antibodies**. However, the fat content is considerably less

TUTORIALS LOGIN FOR SUCCESS

- Advantages:
  - It has a Laxative property.
  - Removes excess bilirubin

Protein content in Colostrum & breast milk

00:02:20

- Protein content in: (very important)
  - Colostrum – 8.6gm /100ml (8 times more than mature milk)
  - Breast milk – 1.1gm/100ml

Fore milk & Hind Milk

00:03:30

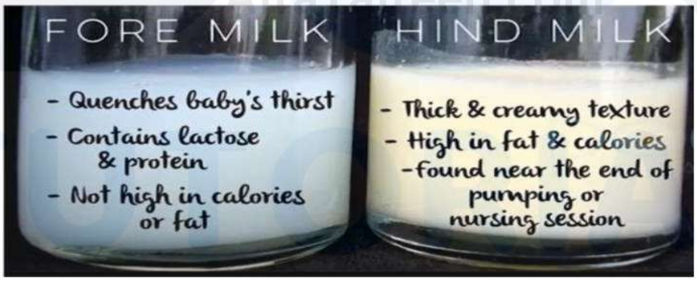

FORE MILK
- Quenches baby's thirst
- Contains lactose & protein
- Not high in calories or fat
HIND MILK
- Thick & creamy texture
- High in fat & calories
-Found near the end of pumping or nursing session

Fig: 1

- Both fore milk & hind milk together provide a balanced diet to the baby
- Foremilk is the milk that your baby drinks at the beginning of a feeding, and hindmilk follows it.
- Typically, foremilk is mostly water combined with other nutrients, and hindmilk is highly fatty. (First thirst and then hunger)

Exclusive breast Milk 00:05:00

- Exclusive breastfeeding means that the infant receives only breast milk. No other liquids or solids are given – not even water – with the exception of oral rehydration solution, or drops/syrups of vitamins, minerals or medicines

Exclusive breast feeding

i. It is giving only breast milk to the newborn
ii. Duration – **6months exclusive**
iii. According to WHO, Breastfeeding should be continued till **2 years.**

World breast feeding week 00:06:00

World breast feeding week → 1-7th of August

EMPOWER PARENTS
•
ENABLE BREASTFEEDING
•

Fig: 2

- The World Breastfeeding Week (WBW) 2021 theme Protect breastfeeding: a shared responsibility is about how breastfeeding contributes to the survival, health and wellbeing of all

Comparison of breast milk & cow milk 00:06:30

	Cow's milk	Human Milk
Lactose (g)	4.4	7.4
Protein (g)	3.2	1.1
Fat (g)	4.1	3.4
Calcium (mg)	120	28
Iron (mg)	0.2	1
Water (g)	87	88
Energy	67	65

- Lactose, iron & water content is more in human milk
- Fat, protein & energy content of milk – Buffalo > Goat > Cow > Human

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Consitituent	Breast milk (gm/L)	Cow's milk (gm/L)
Proteins	11	33
• Casein	4	28
• Soluble proteins	7	5
Lipids	35	35
Carbohydrates		
• Lactose	70	50
• Nitrogenous	62	50
• Oligosaccharides	8	0

Minerals	2	8
• Ca	0.33	1
• P	0.15	1
• Fe	0.4 – 1.5mg	0.3 – 0.5mg
Vitamins		
• C	60mg	20mg
• D	501U	251U
Energy	640-720kcal	650kcal

BFHI 00:07:45

Baby friendly hospital initiative (BFHI)- 2018

- Proposed by WHO, UNICEF
- Breast feeding should be started as soon as possible irrespective of the type of delivery (NVD or LSCS)
  - Ten Steps of the Baby-Friendly Hospital Initiative to promote successful breastfeeding:

1. Have a written breastfeeding policy that is routinely communicated to all health-care staff.
2. Train all health-care staff in skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mothers initiate breastfeeding within one half-hour of birth.
5. Show mothers how to breastfeed and how to maintain lactation even if they should be separated from their infants.

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6. Give newborn infants no food or drink other than breast milk, unless medically indicated.
7. Practice rooming in: Allow mothers and infants to remain together 24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no artificial teat or pacifiers (also called "dummies" or "soothers") to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from hospitals or clinics.

MFCI 00:09:12

Mother Friendly childbirth Initiatives (MFCI)

- Introduced in USA. The following are the initiatives undertaken:
  1. Clearly defined policies & procedures to be done.
  2. Inform public about its practices & procedures
  3. Unrestricted access to birth companion of her choice
  4. Provide culturally competent care
  5. Provide freedom to walk, more & assume any position of her choice during labor
  6. Avoid shaving, enemas, with holding nourishments etc.
  7. Educate staff about non-drug methods of pain relief.

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8. Encourage mothers & their families to care for their babies to the extent compatible with their conditions
9. Discourage non-religious circumcision of new born
10. Promote BFHI

MCH INDICATORS

Importance of MCH Indicators 00:00:20

- Mother and child are the most vulnerable groups in the population. Any small change will be first reflected in mother and child so these are the most sensitive indicators.
- All changes will be first picked by MCH indicators, this is the importance of Mother and Child health Indicators.

Maternal Mortality Ratio 00:01:10

Maternal Indicators

- MMR- MMR stands for maternal mortality ratio.
- The maternal mortality ratio (MMR) is defined as the number of maternal deaths during a given time period per 100,000 live births during the same time period

$$\frac{\text{No. of maternal deaths}}{\text{No of live births}} \times 1{,}00{,}000$$

- This means when 1,00,000 live children are born alive into a population how many maternal deaths are happening.
- In MMR alone the multiplier is 1,00,000 this is because the maternal health has improved a lot, even after 1000 or 10,000 live births not even a single mother was dying so if we still use 1000 as a multiplier, we will get 0.1 or 0.2 as our result so we

would have to depict our result in fraction. To express it as whole number the multiplier has been increased to 1,00,000

Criteria satisfying the definition of maternal death:

i. Death of a woman while she's **pregnant**.

ii. Death within 42 days (6weeks) of termination of pregnancy

iii. Death from any cause related or aggravated by pregnancy

- But NOT from incidental or accidental cause.

Maternal Mortality Rate 00:05:28

Maternal Mortality Rate:

$$\frac{\text{No. of maternal deaths}}{\text{No of woman in reproductive age group}} \times 1,00,000$$

Late Maternal Death 00:06:13

Late maternal mortality:

- If the death of a woman from direct or indirect obstetric cause in between **42days to 1 year** it is called as late maternal death.
- Most common cause of maternal death is **obstetric haemorrhage.**

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RHIME & RAMOS 00:07:10

- Maternal Death is evaluated using a technique called as RHIME which stands for Representative, re-sampled, routine, Household interview of mortality with medical evaluation.
- This is a method that we use to find out the cause of death using verbal autopsy.
- It is a structured investigation of events before death, including a written report in the local language of the household, with various quality controls.
- By talking to people who are very close to mother who died. The field workers as well as doctor will visit the house of person who died or where death occurred.
- They talk to the victims' friends and relatives to know what are the medical as well as social causes that has lead to maternal death. So, this is a method for evaluating the cause of maternal death.

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RAMOS:

- It stands for Reproductive Age Mortality Studies
- This is also another verbal autopsy method by which we evaluate the cause of death in maternal deaths
- Relies on multiple sources of data, once adult female deaths have been identified, a verbal autopsy or medical records or a combination of both are used to determine cause of death

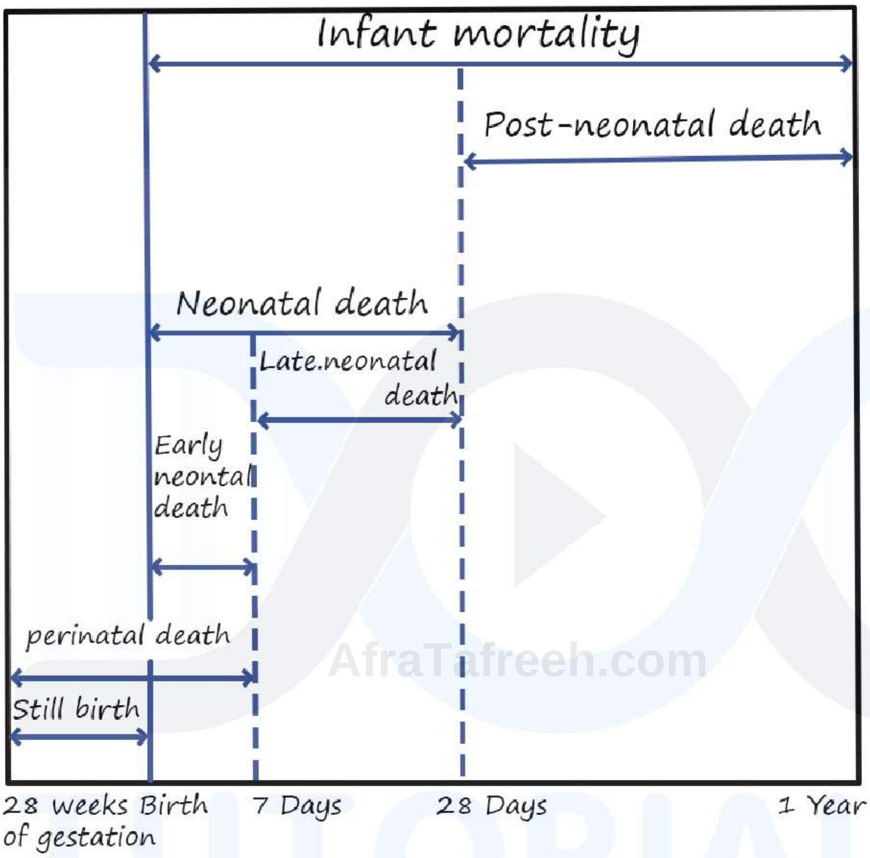
Child Indicators

i. Perinatal mortality rate
ii. Neonatal mortality rate
iii. Post neonatal mortality rate
iv. Infant mortality rate
v. 1–4-year mortality rate/child death rate
vi. Under 5 mortality rate/ child mortality rate

- The denominator for all except 1–4-year mortality rate is Total no. of live births.
- Infancy means from birth to one year is infancy which is again divided into 1st month and rest of the months.
- 1st one month is 28days-this is called as neonatal period. And the rest of the month is post neonatal period
- The 1st week of the 1st month is called as early neonatal period. And the rest of the month is called as late neonatal period.
- Still birth means a baby dying before delivery but after completing viability, a child becomes viable after 28 weeks of gestation so that means a child dying after completing 28weeks but before birth is still birth.
- Peri means in and around, so perinatal means in and around the time of birth, that includes few days before birth and few days after birth. few days before birth is nothing but the time you consider as still birth and a few days after birth is nothing but what we consider as early neonatal

period. So, this means still birth + the time in early neonatal period is perinatal period.

- The deaths occurring during these periods are the numerator.


Infant mortality
Post-neonatal death
Neonatal death
Late.neonatal death
Early neontal death
perinatal death
Still birth
28 weeks of gestation
Birth
7 Days
28 Days
1 Year

Neonatal mortality rate (NNMR)

$$\frac{\text{No. Of deaths of neonates (under 28 days of age)}}{\text{Total no of live births in the same year}} \times 1000$$

i. Early neonatal mortality rate (ENNM) i.e., 1-7days
ii. Late neonatal mortality rate (LNNM) i.e., 8-28days

Post-neonatal mortality rate (PNNMR)

$$\frac{\text{No. of death of children between 28days and 1yr}}{\text{Total live births in the same year}} \times 1000$$

Infant mortality rate

$$\frac{\text{No of deaths of children less than 1yr of age}}{\text{Total No of live births}} \times 1000$$

1-4-year mortality rate (Child death Rate)

$$\frac{\text{No. Of deaths of children aged 1-4 years'}}{\text{Total no. of children aged 1-4 years}} \times 1000$$

Under 5 mortality rates (child mortality rate)

$$\frac{\text{No. of deaths of children less than 5 years of age in a given year}}{\text{No. Of live births in the same year}} \times 1000$$

Child survival rate (index)

- It tells us how when 1000 children are born alive into a population how many under 5's are surviving
- 1000 - under 5 mortality rates
- It is usually expressed in %.
- we want to make this per 100 so we divide by 10.

$$\frac{1000 - \text{under 5 mortality rates}}{10}$$

- Latest Child survival rate = 95.2%

Perinatal mortality rate (PNMR)

- It is the number of still births + early neonatal deaths/ total no of live births.
- Since it includes total number of still births as well in the denominator, we should also include the total number of still births.

$$\frac{\text{No. of still births/Late fetal deaths + early neonatal deaths}}{\text{No of live births + no of still births}} \times 1000$$

Still birth 00:20:50

Still birth: definition's

i. >28 weeks of gestation but before birth
ii. If the birth weight of baby is more than 1000gm
iii. Crown heal length > 35cm

- Still birth rate = Fetal deaths weighing over 1000 g at birth during the year/Total live + still births weighing over 1000 g at birth during the year X 1000

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MAPEDIR 00:22:00

MAPEDIR

- Maternal and Perinatal Death Inquiry and Response
- It is a method of inquiring cause of maternal as well as perinatal death.

INAP 00:22:56

India Newborn Action Plan:

- It was launched in September 2014, for accelerating the reduction of preventable newborn deaths and stillbirths in the country
- It is a new strategy we have under MCH
- The goal is to reduce our NMR and still birth rate to single digit by the year 2030.
  1. Builds on existing commitments under the National Health Mission and 'Call to Action' for Child Survival and Development
  2. Aligns with the Global Every Newborn Action Plan (ENAP); defines commitments based on specific contextual needs of the country
  3. Aims at attaining Single Digit Neonatal Mortality Rate by 2030, five years ahead of the global plan
  4. Emphasizes strengthened surveillance mechanism for tracking stillbirths
  5. Focuses on ending preventable newborn deaths, improving quality of care and care beyond survival
  6. Prioritizes those babies that are born too soon, too small, or sick—as they account for majority of all newborn deaths

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7. Aspires towards ensuring equitable progress for girls and boys, rural and urban, rich and poor, and between districts and states
8. Identifies major guiding principles under the over-arching principle of Integration: Equity, Gender, Quality of Care, Convergence, Accountability, and Partnerships
9. Defines six pillars of interventions: Pre-conception and antenatal care; Care during labour and child birth; Immediate newborn care; Care of healthy newborn; Care of small and sick newborn; and Care beyond newborn survival
10. Serves as a framework for states/districts to develop their own action plan with measurable indicators

IMR (Infant mortality Rate)

- It is the single best indicator of socio-economic development of a country
- But UNICEF considers under 5 mortality rates as the best indicator of socioeconomic development of country.
- IMR is the most important indicator of health status of a community.
- Level of living of people in general is given by IMR
- Effectiveness of MCH services is given by IMR
- Largest single age category of mortality is given by IMR.

CHILDHOOD DISEASES

Under 5 deaths in developing countries 00:00:30

- The following are some of the reasons for the increasing number of deaths in the developing countries:
  - i. Lack in timely diagnosis
  - ii. Poor health seeking behavior of people in developing countries
  - iii. Socioeconomic conditions

IMCI 00:01:30

- The most common causes of infant and child mortality in developing countries (including India) are:
  - Acute respiratory infections
  - Diarrhoea
  - Malaria
  - Measles and
  - Malnutrition

IMCI

- Introduced by WHO and UNICEF
- Stands for integrated management of childhood illness.
- The management protocols of various childhood illness are integrated by IMCI.

- Another reason for increased death in developing countries is improper diagnosis of under 5 diseases.
- Hence, the protocol for various childhood illness are integrated along with the preventive, promotive and curative services under IMCI.
  - What is done under IMCI?
    - It is mainly for developing countries including India.
    - The major under 5 killers are identified, their signs and symptoms clubbed and classified into 3 categories and each category is given a color.

Signs	Classify as	Identify treatment
-Not able to feed -No attachment at all -Not sucking at all	Not able to feed – possible serious bacterial infection **Admission or Referral is advised**	- Give first dose of intramuscular antibiotics - Treat to prevent low blood sugar - Advise mother how to keep the infant warm on the way to the hospital
-Not well attached to breast	Feeding problem	- Advise the mother to breastfeed

-Not suckling effectively -Less than 8 breastfeeds in 24 hours -Receives other foods or drinks -Low weight for age -Thrush (Ulcers or white patches in mouth)	or low weight **Out Patient management is required**	often and for as long as the infant wants. - If not well attached or not suckling effectively, teach correct positioning and attachment. - If breastfeeding less than 8 times in 24 hours advise to increase frequency of feeding. - If receiving other foods or drinks, counsel mother about breastfeeding more reducing other foods or drinks, and using a cup. - If not breastfeeding at all:→ - Refer for breastfeeding counseling and possible relaxation, - Advise about correctly prepared

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		breastmilk substitutes and using a cup - If there is thrush, teach the mother to treat it at home. - Follow-up any feeding problem or thrush in 2 days - Follow-up low weight for age in 14 days
-Not low weight for age and no other signs of inadequate feeding	No feeding problem **Home management is enough**	- Advise mother to give home care for the infant - Praise the mother for feeding the infant well

- The 3 colors are green, yellow and, pink.

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Advantage of IMCI:

- If the field workers are trained well, they can **identify the disease at the earliest** and do what is necessary, thereby, preventing the consequences of delayed diagnosis
- The number of under 5 deaths in India and developing countries drastically dropped due to IMCI

The 5 diseases under IMCI:

- Acute Respiratory Infection (ARI)
- Acute Diarrheal Disease (ADD)
- Malaria
- Measles
- Malnutrition

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Difference between IMCI & IMNCI 00:06:15

IMNCI

- Integrated management of neonatal child illness (**Indian version of IMCI**)
- In India around **18% of under 5 deaths were neonatal**.
- Neonatal mortality contributes to over 64% of infant deaths and most of these deaths occur during first week of life (first week of life was not included in IMCI) Thus IMNCI adapted in India
- The major highlights of the Indian adaptation are:

- Inclusion of 0 – 7 days age in the program
- Training of the health personnel begins with sick young infants up to 2 months (sick young infant)
- Proportion of training time devoted to sick young infant (0d – 2months age) and sick child (2months – 5 yr. of age) is almost equal
- Is skill based
- Incorporates the national guidelines on

- Malaria,
- Anaemia,
- Vitamin a supplementation and
- Immunization schedule

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Extra components of IMNCI in India:

1.Treatment of
  - Malaria
  - vitamin A deficiency
  - anemia

2.Promoting breast feeding and complimentary feeding

3.0-7days children are also included in IMNCI

4.Training of staff starts with treating early neonates and young infants (children 0-2months)

5.Home based neonatal care is included in IMNCI

IMNCI Plus

- It is IMNCI plus 3 components
- The 3 components are "**CBI**" which stand for:

i. Care at birth

ii. Behavioral change and communication with parents

iii. Immunization

MALNUTRITION

- Malnutrition refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients. The term malnutrition addresses 3 broad groups of conditions:
  - Undernutrition, which includes wasting (low weight-for-height), stunting (low height-for-age) and underweight (low weight-for-age);
  - Micronutrient-related malnutrition, which includes micronutrient deficiencies (a lack of important vitamins and minerals) or micronutrient excess; and
  - Overweight, obesity and diet-related noncommunicable diseases (such as heart disease, stroke, diabetes and some cancers)

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Acute malnutrition 00:00:24

Two types of malnutrition:

i. Acute malnutrition

ii. Chronic malnutrition

Acute malnutrition:

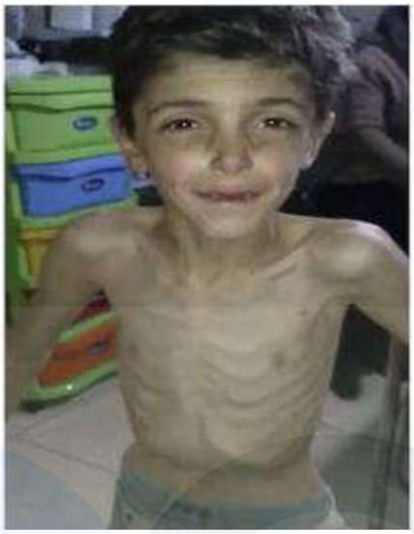

Fig: 1

- **Low weight for height**
- Wasting /emaciation

Chronic Malnutrition 00:01:39

Chronic malnutrition:

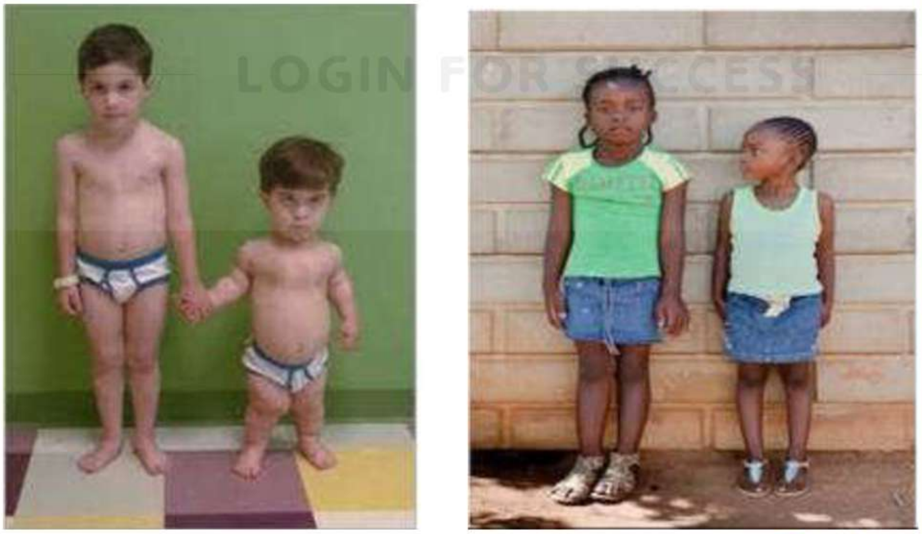

Fig: 2

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- **Low height for age**
- Dwarfing/stunting

Underweight 00:02:55

Low weight for age (underweight)

- Common for acute or chronic malnutrition
- Change in weight → acute or present health
- Change in height → chronic or past health

Weight:

- Single best parameter for assessment of physical growth
- Most sensitive & reliable measure of growth

SAM 00:04:15

Severe acute malnutrition (SAM) → Severe Acute Malnutrition is both a medical and social disorder

The following are the 4 criteria for SAM as per WHO:

i. Very low weight for height → defined as (Z score < – 3 SD)

ii. Mid arm circumference is < 11.5 cm

iii. Presence of nutritional edema

iv. Marasmic kwashiorkor

- To treat children with SAM, there are nutritional rehabilitation centers (NRC)
  - Nutrition Rehabilitation Center (NRC) is a in a health facility where children with Severe Acute Malnutrition (SAM) are admitted and managed

Aim of Nutritional Rehabilitation Centre (NRC):

- To provide medical & nutritional care to SAM children under 5yrs of age with medical complications.
- To improve skills of mothers

NRC 00:06:20

Medical complication management:

Phase	Diet	Function
• Stabilization (1-2 days)	• Starter diet (F75)	Resolved: • Metabolic function • Electrolyte balance
• Transition (2-3 days)	• Catch up diet (F100)	• Loss of edema • Return of appetite
• Rehabilitation	• Normal diet	i. Rapid weight gain and pysical and emotional development

Aim of Nutritional Rehabilitation Centre (NRC):

<table>
<tr><th colspan="2">Children less than 6 months of age</th></tr>
<tr><td>• Admission criteria
- Problem of breastfeeding: the infant is too weak to suck
• And/or
- The mother has not enough milk
• And/or
- Bilateral pitting oedema
• And/or
- W/H or W/L < -3 z score (WHO – 2005 standards)</td><td>• Discharge Criteria
- Child is gaining weight on breast milk alone, regardless of current weight or W/H%
- No medical complications
- Absence of bilateral oedema for at least past 10 days</td></tr>
<tr><td colspan="2">• For children <6 months of age suffering from severe acute malnutrition, emphasis is laid on supporting and sustaining breastfeeding through counselling and re-establishment of lactation in mothers with lactation failure using supplementary suckling technique (SST).</td></tr>
<tr><td colspan="2">Children age 6 months upto 60 months</td></tr>
</table>

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• Admission criteria - W/H or W/L <-3 z score (WHO – 2005 standards) • And/or - MUAC <11.5 cm • And/or - Presence of bilateral oedema	• Discharge criteria - 15% weight gain from admission Wt. or weight on the day free of oedema - Absence of bilateral oedema for at least 10 days - No medical complications

Follow up session

- The child is enrolled in a nearby **Anganwadi centre**
- Anganwadi worker visits
- **every week for the first 4 weeks** and after that
- visits once in every **2 weeks.**
- **Rs 50 per visit** is paid to the Anganwadi worker

NEWER TECHNOLOGIES IN M.C.H

e-Mamta (MCTS) 00:00:17

I. e-Mamta

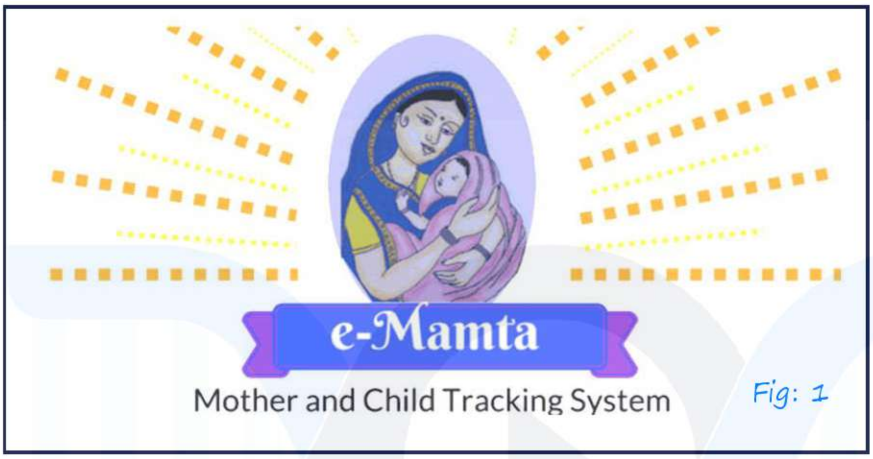
e-Mamta
Mother and Child Tracking System

Fig: 1

- Mamta means motherhood.
- e-Mamta means motherhood going online.
- e-Mamta is a citizen-centric service delivery initiative which leverages information and communication technology to track the progress of pregnant mothers, and integrates non-recipients of services into the health care system.
- It is a **mother and child tracking system**. (MCTS)
- It is a web-based portal in which all the details of pregnant woman as well as their children **upto the age of 5 years** is included.
- The objective of e-Mamta or MCTS is to timely deliver appropriate services to mothers as well as their children upto the age of 5 years.

Kilkari mobile app 00:01:28

II. Kilkari

- **It is a mobile health education service designed to help new and expecting mothers make healthier choices and lead longer lives**
- kilkari is a mobile app to **deliver weekly message to pregnant woman and the mother of children unto the age of 1 year.**
- This is an **Interactive voice response (IVR)**. Which provides free time sensitive audio information about (Reproductive mother, neonatal and child health (RMNCH) directly to the phones of pregnant women, mother of young children and their families.

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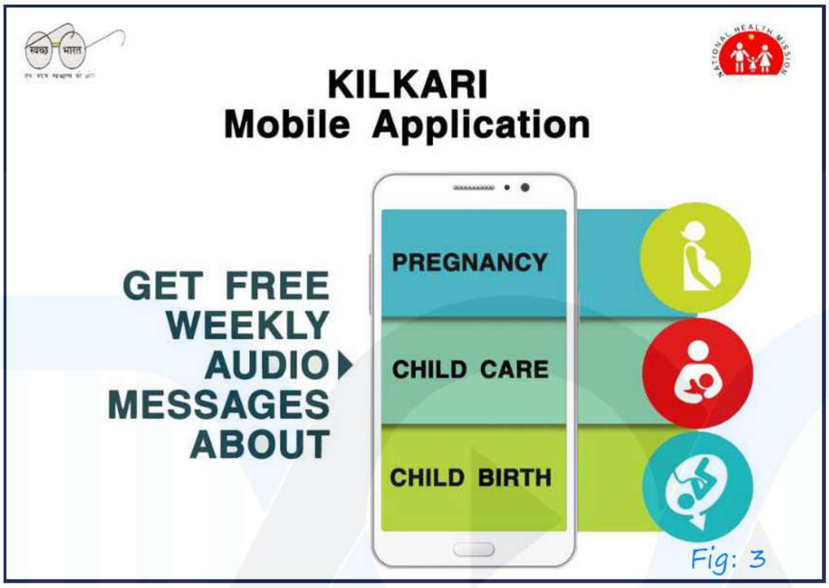
भारत सरकार प्रस्तुत करते हैं
मोबाईल में किलकारी माँ बनने की पूरी तैयारी
किलकारी
हर माँ की अपनी स्वास्थ्य सेवा

Fig: 2

- Through the kilkari app, weekly time appropriate **72 audio messages** about pregnancy, child birth and child care from the second trimester of pregnancy until the child attains the age of 1 year are given.



KILKARI
Mobile Application

GET FREE WEEKLY AUDIO MESSAGES ABOUT

PREGNANCY

CHILD CARE

CHILD BIRTH

Fig: 3

- Kilkari (a baby's gurgle in Hindi) Weekly, pre-recorded, outbound calls begin in the second trimester of pregnancy and continue until the child is one year old. Call costs are covered by the government.

INTRODUCTION TO NUTRITION

Nutrition 00:00:25

- Nutrition: The science of food and its relation to health
- Food: Anything which provides energy and nutrients
- Nutrients are Substances which are required for Growth, Development and Maintenance of Body Functions

The food consumed consists of:

- Macronutrients – large quantities (carbohydrates, proteins and fats)
- Micronutrients – small quantities (vitamins and minerals)
- Trace elements - < 0.01%

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Macronutrients

- Also known as **proximate principles** – as they constitute the major chunk of the diet.
- Provide **energy**
- Carbohydrates – 4 kcal/g
- Protein – 4 Cal/g
- Fat – 9 Cal/g
- Dietary fiber – 2Cal/g
- Alcohol – 7 Cal/g

Micronutrients

- Protect health

Dietary Goals 00:05:00

Dietary goals/prudent diet

- Carbohydrates – 50-80% of total daily intake of the diet (Refined carbohydrates avoided)
- Protein – 10-15% of diet
- Fat – 15-30% of diet (PUFA preferred than MUFA)

(Saturated <10% of total energy intake)

- Salt - < 5g/day
- Junk food should be reduced

Carbohydrate and protein requirement

- 400-500 g/day – carbohydrates (420gm)
- Protein:
  i. Low quality protein (vegetables) – 1g/kg
  ii. High quality protein (animal) – 0.83g/kg
- Therefore, a person weighing 60 kgs needs 60gms of protein.

MCQs 00:08:15

- ATKINs diet- Low carbohydrate diet (The only one nutrient in less amount best tolerated is low carbohydrate, thus could be reduced)

RDA AND PAR

RDA 00:00:10

Recommended daily allowance (RDA)

- Average daily dietary Nutrient intake level, Sufficient to meet the nutrient requirement of nearly all (97-98%) healthy Individuals in a particular life stage and gender group.
- Takes into account- Individual Variability, Bio Availability
- This amount should satisfy the (mean ±2SD) need of the entire population – "**nearly all**"
- that is, it should satisfy **97.5% of population**
- Includes Minimum requirement + safety margin (not induced energy)
- The safety margin is **not applicable for energy**

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PAR 00:03:30

Physical activity Ratio (PAR)

- Ratio between the energy used for a particular activity and the basal metabolic rate (BMR).
- In this ratio, Energy cost of an activity/minute to energy cost of basal metabolism per minute is made

$$= \frac{\text{Energy cost of an activity/min}}{\text{Energy cost of basal metabolism}}$$

- sitting at rest is 1.2; for walking at a normal pace, 4; and for jogging, 7.
- It is a unit less measure
- Sleep – **PAR – 1**
- Leisure activities – **PAR – 2**
- Hard work **PAR-3**

ASSESSMENT OF PROTEINS

Assessment of protein 00:00:20

- Assessment of protein can be performed in 2 ways:
  1. Quantity -1
  2. Quality-7

Quantity

- Out of the total energy obtained from the diet. How much of it is obtained from protein alone?

- Formula:

$$\frac{\text{Energy from protein.}}{\text{Energy from total diet}} \times 1000$$

Assessment of Quality of Protein 00:01:40

- Egg proteins are called reference proteins, because these proteins contain all the essential amino acids in the optimum proportions required by the body.
- Based on it we can assess the quality of proteins.

Quality:

- Assessment of protein quality:
  - i. Digestibility Co-efficient
  - ii. Biological value
  - iii. Net protein utilization (NPU)
  - iv. Amino acid score (chemical score)
  - v. Protein digestibility corrected amino acid score (PDCAAS)

vi. DIASS (digestible Indispensable Amino Acid Score)
vii. Protein efficiency ratio

I. Digestibility Co-efficient:

- Protein (N_2) from food reaching blood. i.e., digested proteins

$$\frac{\text{Protein intake (gm)} - \text{Protein lost in digestion (gm)} \times 100}{\text{Protein intake (gm)}}$$

II. Biological Value:

- Protein (N_2) from blood reaching the tissue, i.e. Protein used for body building

$$\frac{\text{Protein digested (gm)} - \text{Protein lost in metabolism (gm)} \times 100}{\text{Protein intake (gm)}}$$

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III. Net protein Utilization (NPU):

- It includes proteins being absorbed from food into blood and ultimately tissues. (Digestibility Co-efficient + biological Value)

Formula:

$$\frac{\text{Digestibility co-efficient} \times \text{Biological Value}}{100} = \text{NPU}$$

(Or)

$$\frac{\text{N2 retained}}{\text{N2 in food}}$$

- As the NPU increases, **more protein (N_2) is retained or utilized for tissue building.**
  - NPU Values
    - i. Egg - 96
    - ii. Milk - 81
    - iii. Meat -79
    - iv. Fish – 77
  - As the NPU value of food item increases, the requirement of that particular protein decreases.
- Egg Protein:
  - Egg protein is also known as **reference protein** as it has highest NPU value. (Reference protein: a protein that has all the amino acids in the correct proportion needed by the body)
- Breast Milk:
  - It is also a reference protein.

IV. Amino Acid Score:

Formula

$$\frac{\text{Amino acid per gram of test proteins.}}{\text{Same amino acid per gram of egg protein}} \times 100$$

- Amino acid score is also known as **chemical score.**

V. Protein Digestibility Corrected Amino Acid Score (PDCAAS)

- It is a modification of amino acid score.
- Along with amino acid score, the digestibility co-efficient is also taken into consideration.

VI. Digestible Indispensable Amino Acid Score (DIAAS)

- This is the current accepted level of protein quality.
- DIAAS accounts for amino acid digestibility at the end of the small intestine, providing a more accurate measure of the amounts of amino acids absorbed by the body and the protein's contribution to human amino acid and nitrogen requirements.
- This is in contrast to the PDCAAS, which is based on an estimate of digestibility over the total digestive tract.

VII. Protein efficiency ratio:

- It is the ratio of gain in weight per unit protein consumed.

Formula:

$$\frac{\text{Gain in body weight (g)}}{\text{Proteins ingested in (g)}}$$

ESSENTIAL AND LIMITING AMINO ACIDS

- They are essential as the body does not synthesize them and hence, should be obtained from food.

10 essential amino acids (EAA) 00:00:59

- PVT TIM HALL

  1.Phenylalanine

  2.Valine

  3.Threonine

  4.Tryptophan

  5.Isoleucine

  6.Methionine

  7.Histidine

  8.Arginine

  9.Levine

  10. Lysine

Semi Essential Amino Acids 00:01:29

- An amino acid of which an adequate amount must be consumed in the diet to prevent the use of essential amino acids to synthesize it.

  i. Histidine

  ii.Arginine

Conditionally Essential Amino Acids (CEAA)

00:01:59

- Nonessential (except in times of illness and stress.)
- Body can synthesize these amino acids
- Tyrosine → derived from **phenylalanine**
- Cysteine → derived from **methionine**
- Arginine, Glutamine, Taurine, Glycine [TAG CTG]
- Ornithine, proline, serine

Limiting amino acid 00:03:45

- Amino acid is **most deficient** in a protein
- Cereals → threonine & lysine (TLC)
- Pulses → cysteine & methionine (PCM)
- Maize → Lysine & Tryptophan (MLT)

TUTORIALS LOGIN FOR SUCCESS

Complementary action of protein 00:06:18

- Mixing two incomplete proteins
- Protein complementation is combining plant protein sources to achieve a better amino acid balance than either would have alone.
- Because of differences in amino acid make-up, when plant sources are combined, the strengths of one make up for the deficiencies in another.
- Eg_ mixing rice with dal, roti/putta with dal etc.

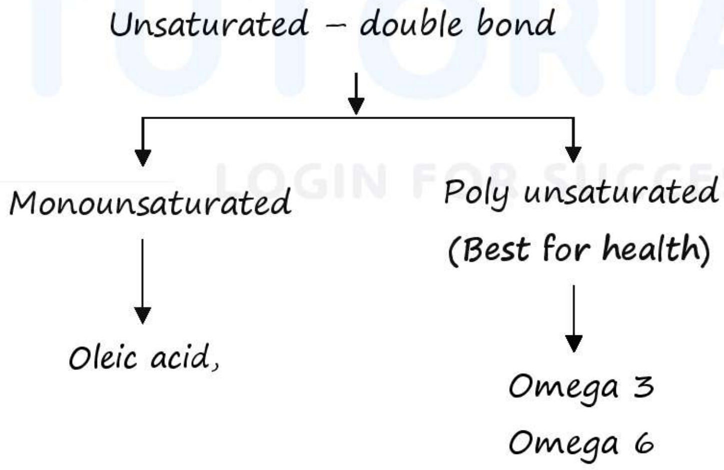
- To avoid the effect of limiting a.a we are using complementary action of protein

ESSENTIAL FATTY ACIDS

- The essential fatty acids (EFA) refer to those fatty acids (PUFA) that must be provided by foods because these cannot be synthesized in the body yet are necessary for health.
- There are two families of EFA, omega-3 (ω-3) and omega-6 (ω-6).
- Obtained only from food
- Used to be known as Vitamin F

Fatty acids are divided into 00:01:21

i. Saturated – single bond (not good for health)
ii. Unsaturated – double bond


Unsaturated – double bond
Monounsaturated
Poly unsaturated
(Best for health)
Oleic acid,
Omega 3
Omega 6

- Omega 3 fatty acid – Linolenic acid (precursor of omega 3, cardio protective)
- Omega 6 fatty acid – Linoleic acid (good for skin & hair)

- Omega 9 fatty acid – Oleic acid, Erucic acid (non-essential)
- **Most important essential fatty acid – linoleic acid**
- Source of linoleic acid – *Safflower oil*
- Fish is the richest source of Eicosapentatonic acid (EPA)
- Docosahexaenoic acid (DHA) is an omega-3 fatty acid that is found along with eicosapentaenoic acid (EPA) in cold-water fish, including tuna and salmon.
- **Flaxseed oil is the richest source of linolenic acid**

Phrynoderma /Toad skin 00:06:42

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- Phrynoderma is a distinctive form of follicular hyperkeratosis
- Seen in:

i. Essential fatty acid deficiency

ii. Vitamin A deficiency.

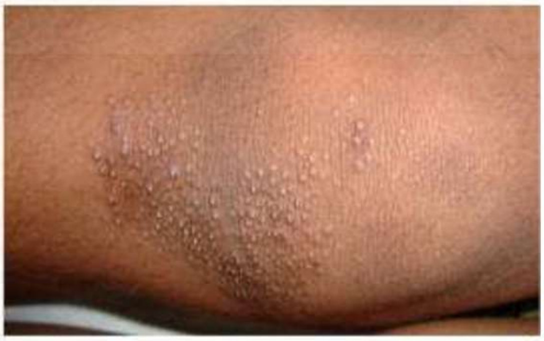

Fig: 1

Poly unsaturated fatty acids (PUFA) 00:07:21

- Hemp oil (795) > safflower oil (77%) >Sunflower oil (69%) > walnut oil 66%) > Soybean oil (61%) > margarine (33%) > Ground nut oil (32%) > Mustard oil (31%) Olive oil (11%) > palm oil (10%) > Butter (4%) >coconut oil.

HEMP OIL
HEMP OIL
HEMP CBD OIL
HEMP OIL
BIO-ACTIVE
HEMP OIL DROPS

Hemp oil Fig: 2

Safflower Sunflower Fig: 3

DIETARY FIBRES & GLYCAEMIC INDEX

- Dietary fibres are **polysaccharides** that contain cellulose, hemicellulose, pectin, gums & mucilage.
- Dietary fiber, also known as roughage, is the indigestible part of plant food.
- RDA → 40g/day.

Glycemic index (GI) 00:01:35

- It is a measure of how quickly a food causes our blood sugar levels to rise.
- The measure ranks food on a scale of 0 to 100. Foods with a high glycemic index, or GI, are quickly digested and absorbed, causing a rapid rise in blood sugar.
- how fast/quicker do 50gms of carbohydrates in the food get converted into sugars.
- Food with highest GI → **Glucose** → GI = **100**

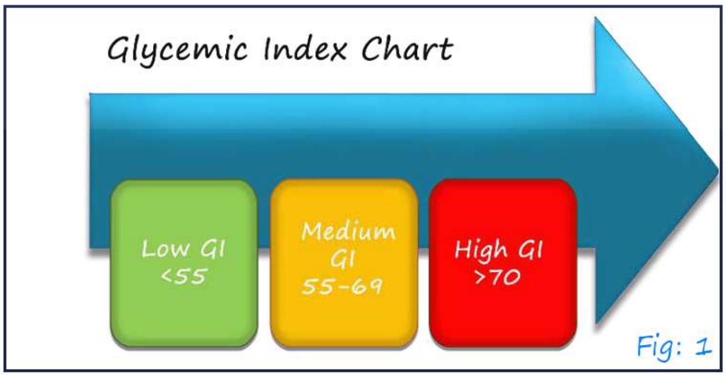

Fig: 1

- Low GI (digested and absorbed at a slower rate, and subsequently, cause a slower rise in blood sugar levels.)→ all fruits and vegetables except baked potatoes, watermelon.

- Medium GI → brown bread.
- High GI (quickly digested and absorbed, causing a rapid rise in blood sugar) → White bread

(Just for reference)

Food	GI	Serving size
Peanuts	14	4 oz. (113g)
Bean sprouts	25	1 cup (104g)
Grapefruit	25	½ large (166g)
Pizza	30	2 slices (260g)
Low fat yogurt	33	1 cup (245g)
Apples	38	1 medium (138g)
Spaghetti	42	1 cup (140g)
Carrots	47	1 large (72g)
Oranges	48	1 medium (131g)
Bananas	52	1 large (136g)
Potato chips	54	4 oz. (114g)
Snickers Bar	55	1 bar (113g)
Brown rice	55	1 cup (195g)
Honey	55	1 tbsp. (21g)
Oatmeal	58	1 cup (234g)
Ice cream	61	1 cup (72g)
Macaroni and cheese	64	1 serving (166g)

Raisins	64	1 small box (43g)
White rice	64	1 cup (186g)
Sugar (sucrose)	68	1 tbsp. (12g)
White bread	70	1 slice (30g)
Watermelon	72	1 cup (154g)
Popcorn	72	2 cups (16g)
Baked potato	85	1 medium (173g)
Glucose	100	(50g)

NUTRITIONAL VALUES OF FOOD ITEMS

EGG: 00:00:30

- 1 egg with the shell is around **60 gm**
- 2 eggs without shell are about 100gm
- 1 egg gives – **70cal, 6gms** protein and 6gm fat along with iron, vitamins except Vit-C, minerals, and carotenoids.
  - It also contains **250mg** of cholesterol (70% of daily requirement for and adult)

Tests to check for freshness of egg

- **Candling method**– If the yolk is clearly visible when a light is passed through it, the egg is fresh.

CANDLING METHOD
Yolk
The yolk is visible

Fig: 1

- **Floating method**– The egg that sinks in a glass of water is a fresh one and the one that does not is not fresh.

DOT TUTORIALS
LOGIN FOR SUCCESS

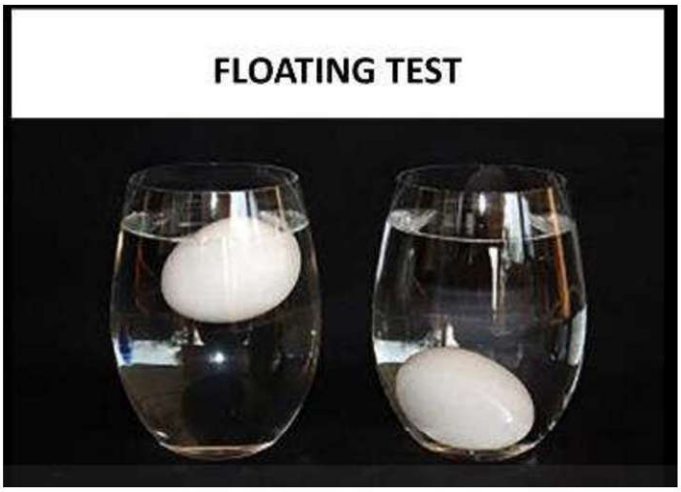

Fig: 2

Fish: 00:04:10

- It is rich in **Polyunsaturated Fatty acid (PUFA)**
  - Eicosapentaenoic acid
  - Docosahexanoic acid (DHA) (also seen in high quantities in breast milk)
  - Liver oils of **HALIBUT** fish are rich in **Vitamin A** & **Vitamin D.**

Fig: 3

- Fish bones are rich in calcium, phosphorus, and fluorides

- Sea fish are rich in **iodine**

Milk: 00:08:10

- 100ml of milk contains **67cal**
- Fats: 3.4 – 8.8%,
- Human milk has more lienolic and oleic acid.
- Vitamin A & D
- Protein: Casein, Lact albumin & Lact globulin.
- All 9 essential amino acids present.
- Animal milk have more protein than human milk, But human milk has more tryptophan and sulphur containing AA
- Sugar: Lactose
- Vitamins: all except Vitamin C
- Minerals: all but a poor source of Iron
- Protein content of various types of milk:
  i. Human milk 1.1gm/100ml
  ii. Cow's milk 3.2gm/100ml
  iii. Colostrum 8.6gm/100ml

Pasteurization: (Very Important)

- Heating of milk to such temperatures and such period of time as are required to destroy any pathogens that may be present, while causing minimal change to its composition, flavour and nutritive value.

- Hot pasteurization.

Method	Temperature	Holding time
Holder/ Vat / batch pasteurisation	63-66°C	30min and cooled to 5 °C
HTST (high temperature short time)	72°C	Less than 15sec and cooled to 4°C
UHT (ultra-high temp) Consists of 2 stages	125°C (2nd stage under pressure)	Less than 2sec and cooled down to 4°C

- **Cold Pasteurization** → ionizing radiation/chemicals are used to kill the microbes.

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Tests for pasteurization: 00:13:20

i. Phosphatase test

ii. Standard Plate count

iii. Coliform Count

Methylene blue reduction test 00:14:26

- It is done on raw milk.
- Methylene blue is a dye which is eaten up by bacteria in the milk. i.e. more the bacteria, the quicker the blue colour disappears and vice versa.

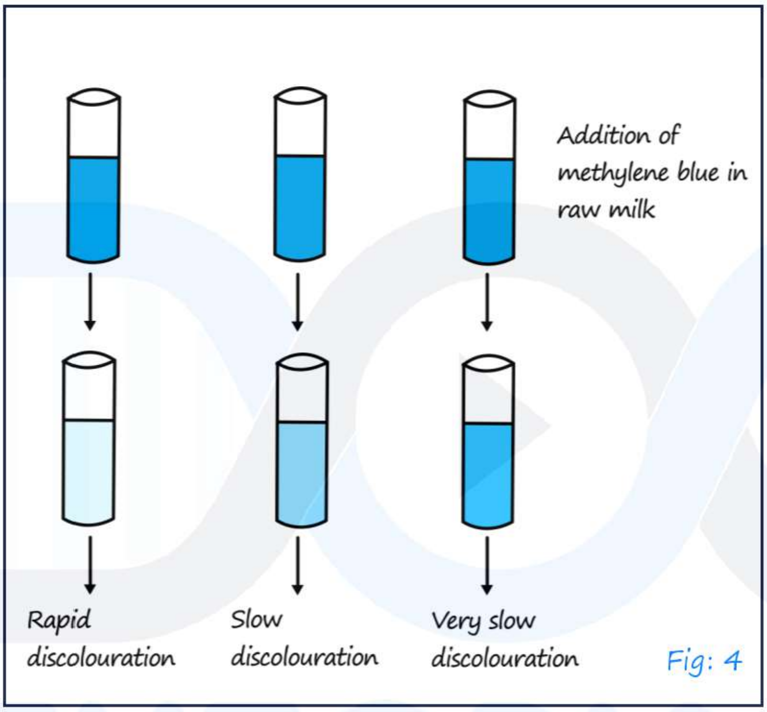

Addition of methylene blue in raw milk
Rapid discolouration
Slow discolouration
Very slow discolouration

Fig: 4

- **Methylene blue reduction test**
  Interpretation: A positive result occurs when the viable bacteria present in the milk decolorizes the milk within certain time and when the milk is not decolorized then it is negative result.

What is Absent?

- Milk is deficient in vitamin C and iron
- Egg is deficient in vitamin C and carbohydrate
- Fish is deficient in Carbohydrate
- Meat is deficient in Calcium

SOYA 00:18:23

- Most important plant protein.
- Contains: 43.2% protein, 20%fat, 4%minerals.
- Highest concentration of Ca, Iron, Vit B
- The limiting amino acid (LAA) is **Methionine**
- Net Protein utilization (NPU)- ***55***

Fig: 5

Protein content / 100g 00:19:25

- Soybean (43)
- Pulses (22-25)
- Fish (21)
- meat (20)
- egg (12)

- Wheat (12)
- Rice (6)
- Milk (3)

Lacto veg→ vegetarians that drink milk.

Ovo veg→ vegetarians that eat eggs.

Lacto ovo veg→ vegetarians that eat eggs and milk

Pescatarian→ fish

Pollotarian → poultry

Flexitarian→ flexible

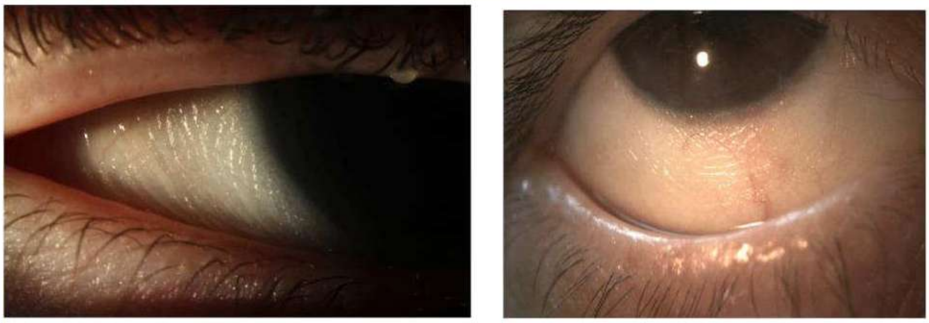
VITAMINS

- Vitamins and minerals are micronutrients
- Vitamins are divided into 2 categories:
  i. Fat-soluble – [A, D, E, K]
  ii. Water soluble – [B complex & C]

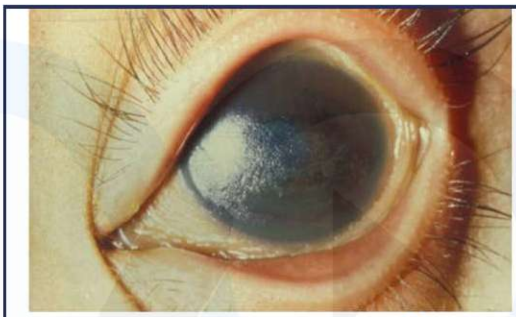
i. Fat Soluble

a. Vitamin A 00:01:12

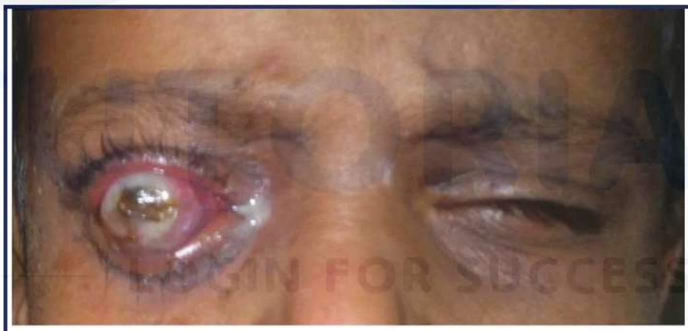
- Recommended dose as Retinol (Microgram) – Vitamin A – 600 mcg (male, female & adolescents)
- Pregnancy – 800 mcg
- Location – 950 mcg
- Deficiency: Extra Ocular manifestations are-Anorexia, Growth retardation, Hyperkeratosis, Susceptibility to Infections
- Ocular Manifestations:
  i. Night blindness (XN)
  ii. X1A: Conjunctival Xerosis
  iii. X1B: Bitot's spots
  iv. **X2** Corneal xerosis.
  v. X3 A & B: Keratomalacia
  vi. XS: Corneal Scars
  vii. XF: Xerophthalmic Fundus
- 1st clinical symptom- conjunctival Xerosis



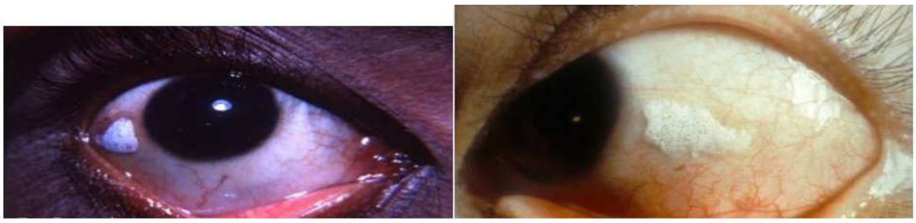
Conjunctival xerosis Fig: 1



Corneal Xerosis Fig: 2



Keratomalacia Fig: 3



Bitot's spots Fig: 4

Treatment

- If the age < 1 year – 1 lakh IU
- If the age > 1 year – 2 lakhs IU
- 3 doses given at Day 0, 1 & 14

Criteria for public health problem

- Check for the deficiency in **6 months** to **6 years'** children and basing on the result, it is decided whether Vitamin A deficiency is a problem in that area.

Criteria:

- Night blindness → > 1%
- Bitot's spots → > 0.5%
- Corneal ulcer → > 0.01%
- Corneal scarring → > 0.05%
- Serum retinol (less than 10mcg/dl) → > 5%

Vitamin A prophylaxis (Very important)

- < 1 yr. → 1 lakh international unit
- > 1 yr. → 2 lakh international unit

Schedule: after 1st dose every 6-month interval one prophylactic dose till 5 years

- 1st dose → 9th month (1 lakh IU)
- 2nd dose → 1 ½ year (2 lakh IU)
- 3rd dose → 2 year (2 lakh IU)
- 4th dose → 2 ½ year (2 lakh IU)

- 5th dose → 3 year (2 lakh IU)
- 6th dose → 3 ½ year (2 lakh IU)
- 7th dose → 4 year (2 lakh IU)
- 8th dose → 4 ½ year (2 lakh IU)
- 9th dose → 5 year (2 lakh IU)
- **Total number of doses –9**
- Total of **17 Lakhs IU** of vitamin A as prophylaxis for a single child.
  - WHO 5 strategies to prevent VAD– Supplementation, Food fortification, promoting breast feeding, Dietary modification, Infection control

b.Vitamin D 00:12:41

- Vitamin D is important micronutrient for teeth and bone.
- RDA – 400IU /day (10mg)

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Deficiency

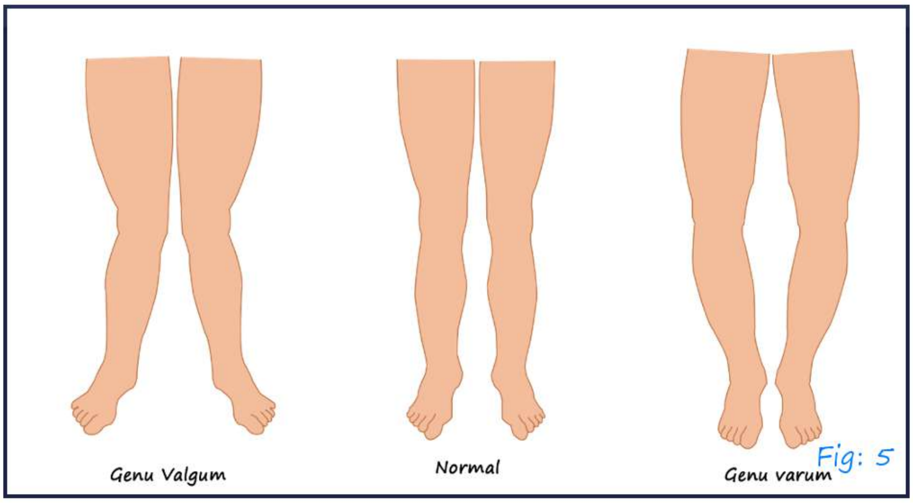

Fig: 5

Rickets

- Bow legs
- X ray-

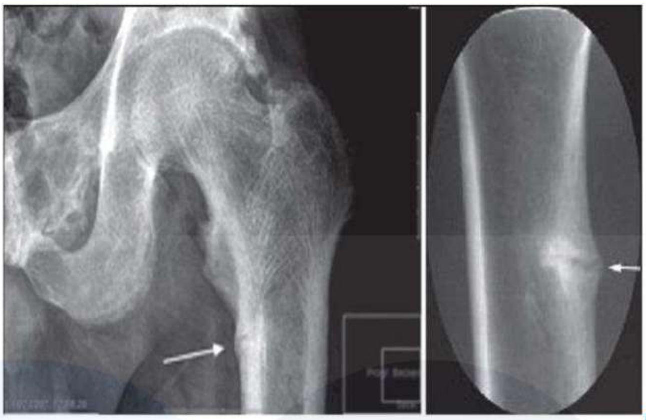

Fig: 6

- Characteristic finding on X ray is **looser zone /Milkman's line**

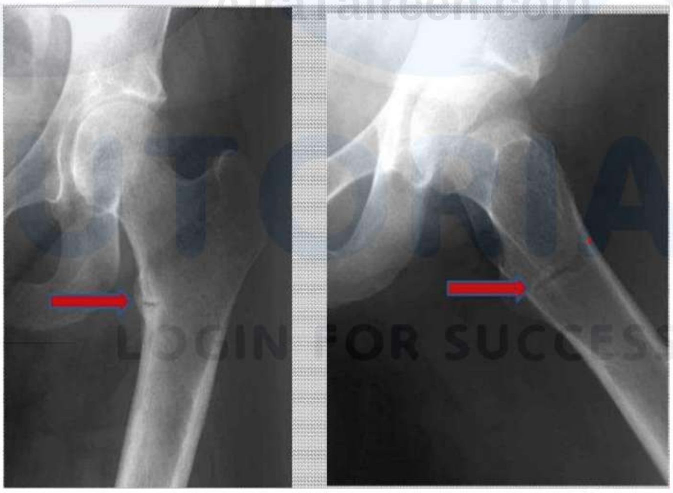

Fig: 7

Prevention:

- Educating parents to expose their children regularly to sunshine
- Periodic dosing of young children with Vitamin-D
- Vitamin D fortification of food

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c. Vitamin E 00:15:09

- Richest source of vitamin E
- **Sunflower oil**
- Vegetable oils
- Cotton seed

d. Vitamin K

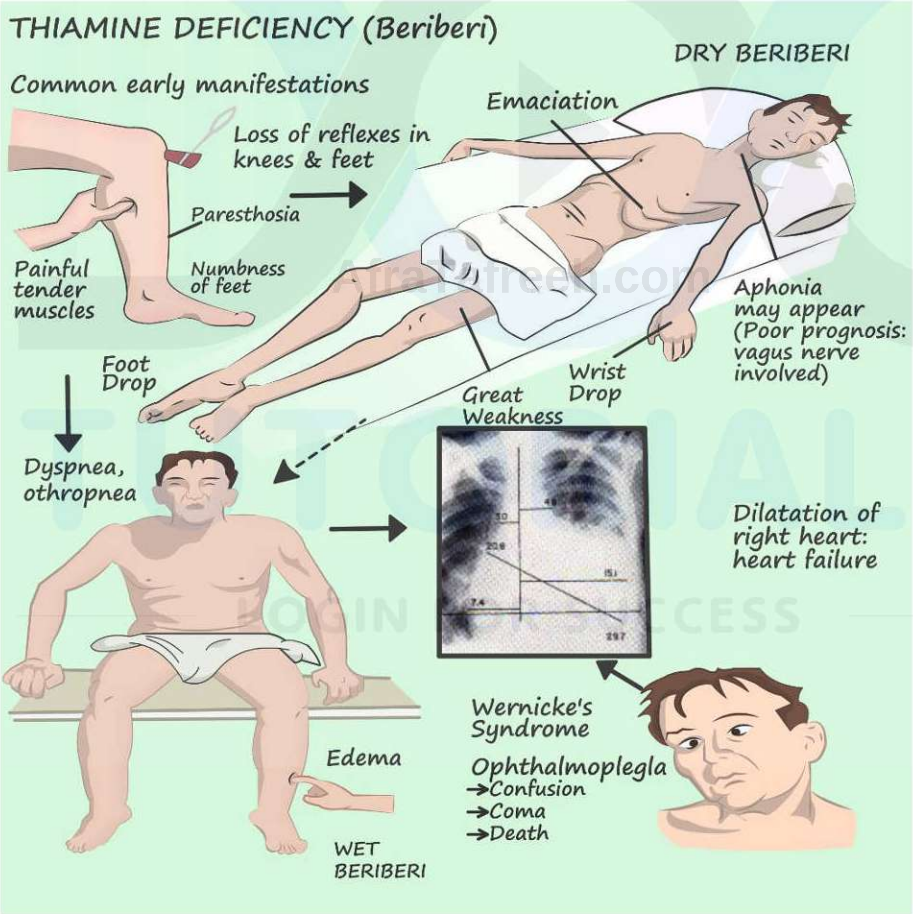
- Deficiency causes **hemorrhagic anemia**

ii. Water soluble vitamins

a. Vitamin B complex 00:15:47

Vitamin	Name	Deficiency
- vitamin B_1	Thiamine	a. Beriberi (Dry, Wet, Infantile) b. Wernicke's Korsakoff syndrome
- vitamin B_2	Riboflavin	Ariboflavinosis (glossitis, cheilosis, dermatitis)
- vitamin B_3	Niacin	Pellagra (4D) Diet rich in Maize and jowar can cause Pellagra
- vitamin B_5	Pantothenic acid	Burning foot syndrome

- vitamin B_6	Pyridoxine	Anaemia & peripheral neuropathy
- vitamin B_7	Biotin	Dermatitis, hair loss, alopecia
- Vitamin B_9	folic acid	Megaloblastic anaemia & neural tube defects
- vitamin B_{12}	Cobalamin	Pernicious anaemia


THIAMINE DEFICIENCY (Beriberi)
Common early manifestations
DRY BERIBERI
Emaciation
Loss of reflexes in knees & feet
Paresthosia
Painful tender muscles
Numbness of feet
Aphonia may appear (Poor prognosis: vagus nerve involved)
Foot Drop
Great Weakness
Wrist Drop
Dyspnea, othropnea
Dilatation of right heart: heart failure
Wernicke's Syndrome
Ophthalmoplegla
→Confusion
→Coma
→Death
Edema
WET BERIBERI

Thiamine deficiency Fig: 8

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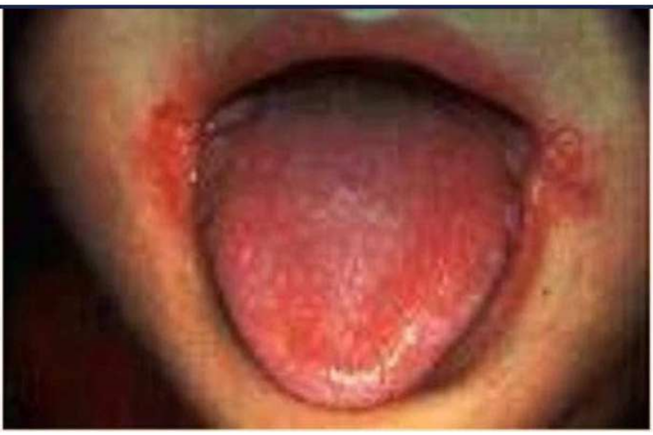
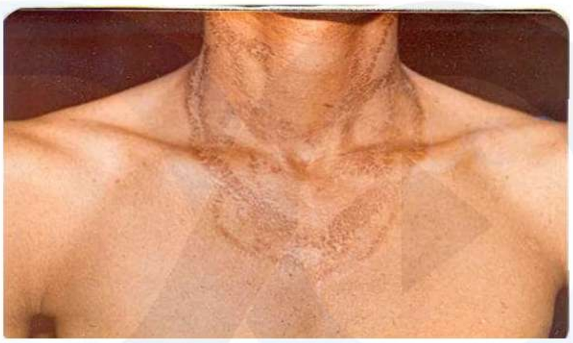


Riboflavin deficiency (ariboflavinosis) Fig: 9



Casal's necklace Fig: 10

- Seen is pellagra

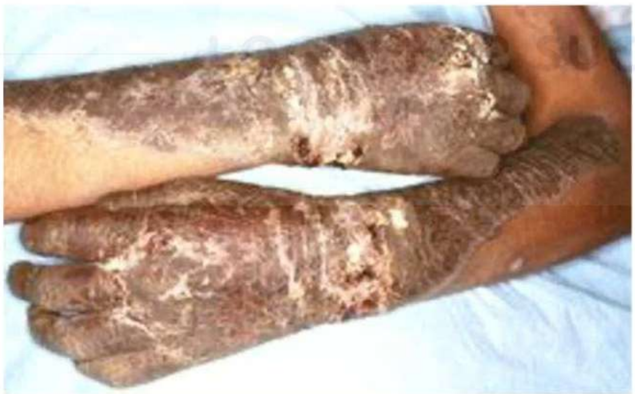


Fig: 11

- Severe dermatitis seen in pellagra extending at the back of hands, wrist and forearms.
- This image is called as **'Gauntlet' sign** of pellagra

- It is common in people consuming **Jowar/Maize**

Jowar (rich in **Leucine**)
↓
⊖
Tryptophan → Niacin

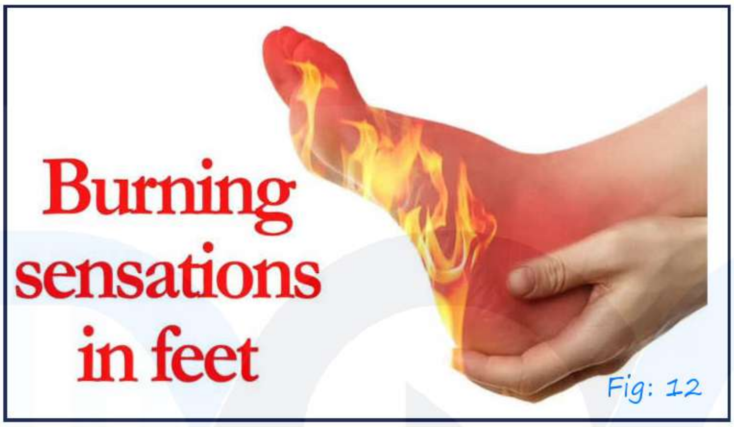
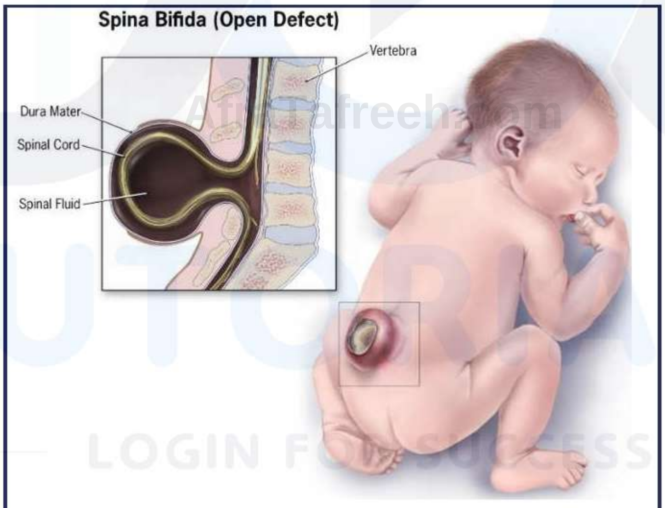

Burning sensations in feet

Fig: 12


Spina Bifida (Open Defect)
Vertebra
Dura Mater
Spinal Cord
Spinal Fluid

Folic acid deficiency Fig: 13

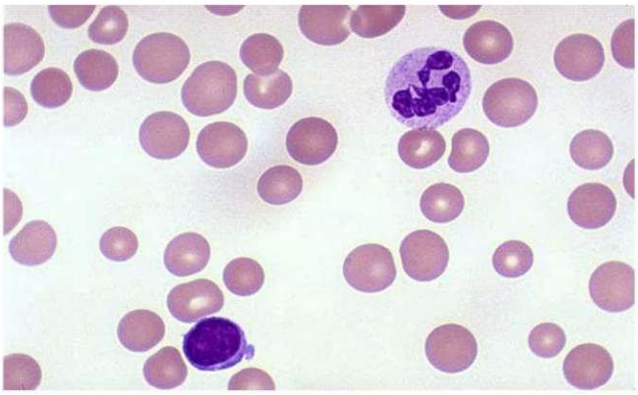


Fig: 14

Megaloblastic anemia (B_9 & B_{12} deficiency)

TUTORIALS LOGIN FOR SUCCESS

Vitamin C 00:24:37

- Most **sensitive to heat**
- Man, monkey, Guinea pig → cannot synthesize in the body & thus need to consume from food.
- Richest source of vitamin C – **Amla (Indian gooseberry)**

Fig: 15

TUTORIALS LOGIN FOR SUCCESS

- Deficiency of vitamin C causes scurvy

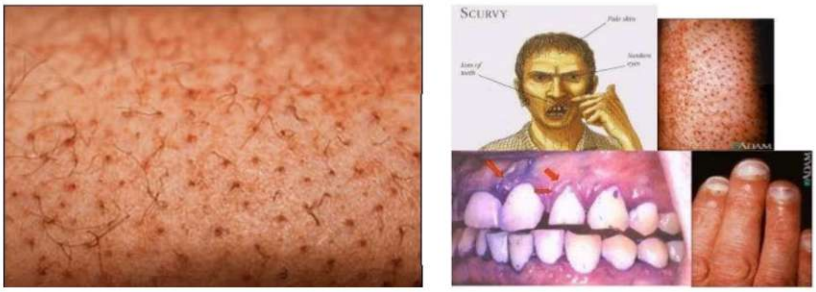


Fig: 16

- Signs & symptoms of scurvy include **bleeding from skin** and **mucosal surfaces.**

MINERALS

Iron 00:00:26

- RDA of iron
  - Adult male – 18mg/day
  - Menstruating – 21mg/day
  - Lactation – 10 mg /day
  - Pregnancy – 27mg/days
  - Infant – 5mg/day

Age groups	No anaemia	Mild	Moderate	Severe
Children 6-59 months of age	≥11	10 - 10.9	7 – 9.9	<7
Children 5-11 years of age	≥11.5	11 – 11.4	8 – 10.9	<8
Children 12-14 years of age	≥12	11 – 11.9	8 – 10.9	<8
Non-pregnant women (15 years of age and above)	≥12	11 – 11.9	8 – 10.9	<8
Pregnant women	≥11	10 - 10.9	7 – 9.9	<7
Men	≥13	11 – 12.9	8 – 10.9	<8

Calcium 00:01:36

- RDA of Calcium
  - Adult male /female / children – 600 mg
  - Pregnancy / lactation – 1200mg
  - Adolescent / postmenopausal – 800mg
  - Infant – 500mg

Iodine 00:02:15

- RDA of iodine
  - Adult – 150 µg/day
  - Pregnancy 250µg/day

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Levels of iodization

- At the production level – **30 ppm**
- At consumer level – **15 ppm**

Iodine deficiency survey done in age groups

- 6-12 years children are included.
- 30 villages are selected and cluster sampling is done
- 30 cluster sampling
- 90 children (45 days + 45 girls)
- Urine iodine levels are measured
- Principal impact indicator recommended for salt iodization program → **urinary iodine levels**
- Urinary excretion is used for surveillance

- Sensitive indicator of environmental iodine deficiency- neonatal hypothyroidism

IDD control & elimination

- % of enlarged thyroid < 5 %
- % of iodized salt consumption > 90%
- Global IDD day- 21st October
- **Double fortification of salt** → Iodine + Iron
- **Triple fortification of salt** → Iodine + Iron + Vitamin A

Fluoride 00:09:17

- Fluorine level required in body **0.5-0.8 mg/l**
- Richest source – water
- If fluorine is < 0.5mg/l – **dental caries**
- > 1.5mg/l – dental mottling
- > 3-6mg/l- skeletal fluorosis
- > 10 mg /l crippling fluorosis

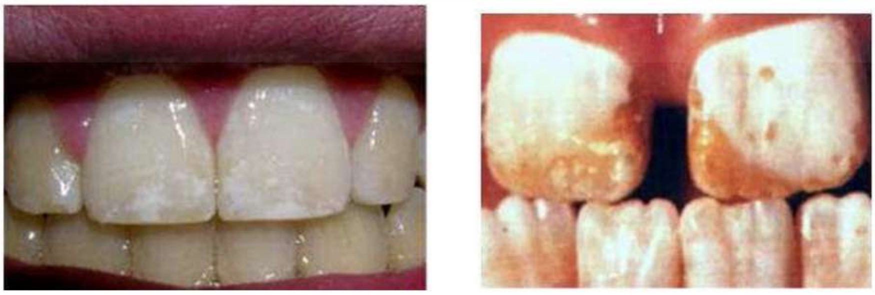

Fig: 1

- Dental fluorosis is also known as **Maldon teeth**

- An indicator of dental caries in the community is **DMF index** →(Decayed, mottled, fallen)

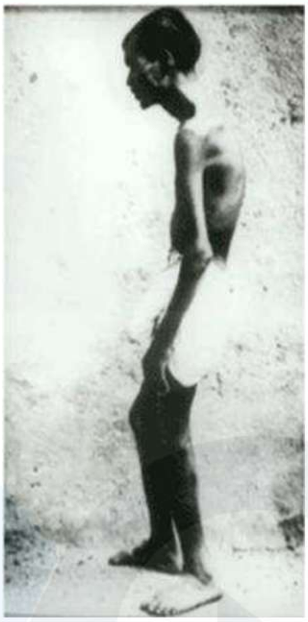

Fig: 2

Skeletal fluorosis

- In skeletal fluorosis any part of skeletal system is affected
- When it affects the vertebral column, causing stiffening → **poker back**.

TUTORIALS LOGIN FOR SUCCESS

- Prevention & control:
  - Changing the water Source: 0.5 to0.8 mg/L, Surface water
  - Chemical Treatment: Nalgonda Technique
  - By National Environmental Engineering Research Institute, Nagpur
  - Other Measures: Avoid Flouride Supplementation in Children & Fluoride Toothpastes

DATA & VARIABLES

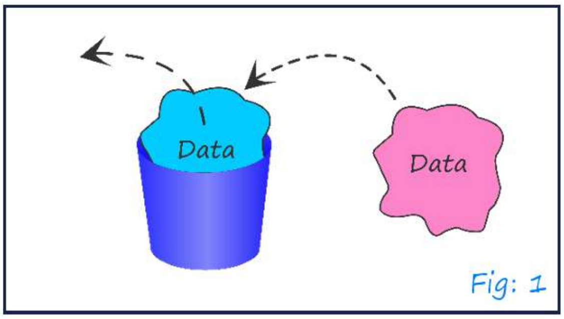

Fig: 1

Data 00:04:45

- Any discrete observation.
- It refers to a set of values, which are usually organized by variables (what is being measured) and observational units (members of the sample/population)
- It is raw, which when processed gives information or knowledge (graphs, charts etc.)

Data

Primary
↓
Directly from source
↓
Gives the best information

Secondary
↓
Indirect
E.g.: from case sheets

Variables 00:09:20

- An attribute that varies from person to person e.g., height, weight, age etc.
  - Variable is an attribute of study and data is the number attached to it
  - E. g: weight (variable) of a person = 80kg (Data)

Variable

Qualitative/categorized

i. **Nominal** variable (name, gender, blood groups, etc.)

ii. **Ordinal** variable (order → types of pain, TNM classification, GCS, APGAR score)

iii. **Binomial/Dichotomous** variable (when only 2 outcomes are possible e.g., pass/fail, dead/alive)

Numerical/Quantitative variable (measurable)

i. **Continuous** variable: (aka ratio variables) (decimals are possible → height, weight, **age** etc.)

ii. **Discrete** variable: (aka integer variables) (whole number → no. of children etc.)

Eg: Number of students in a class

TUTORIALS LOGIN FOR SUCCESS

SCALES OF MEASUREMENT

- Scales of measurement is how variables are defined and categorised. Psychologist Stanley Stevens developed the four common scales of measurement

Four Scales of measurement 00:00:19

Nominal Scale: each value having a unique meaning

- Nominal variable
- E.g., Blood group
- No meaningful order

Ordinal Scale: values have an ordered relationship to one another.

- Has a meaningful order
- No meaningful interval

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Interval Scale:

- **The data points along the scale are equal, so the difference between data points one and two will be the same as the difference between data points five and six.**
- Meaningful interval and order are present but there is no meaningful ratio.
- No absolute zero
- No meaningful ratio

- E.g., **Celsius Scale, pH, Fahrenheit**, etc

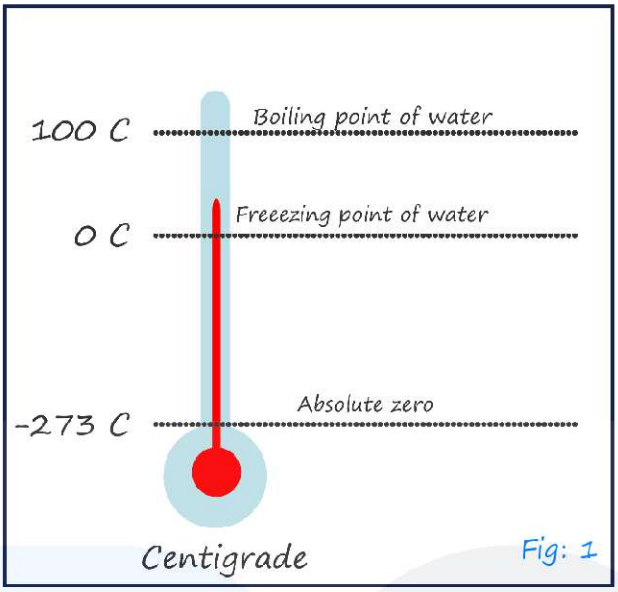
100 C
Boiling point of water
0 C
Freeezing point of water
-273 C
Absolute zero
Centigrade

Fig: 1

Ratio Scale:

- A minimum value of zero means the scale has a true/absolute zero point. Degrees, for example, can fall below zero and still have meaning. But if you weigh nothing, you don't exist.
- Has a meaningful ratio
- Absolute Zero
- E.g., Kelvin scale, Height and weight etc.

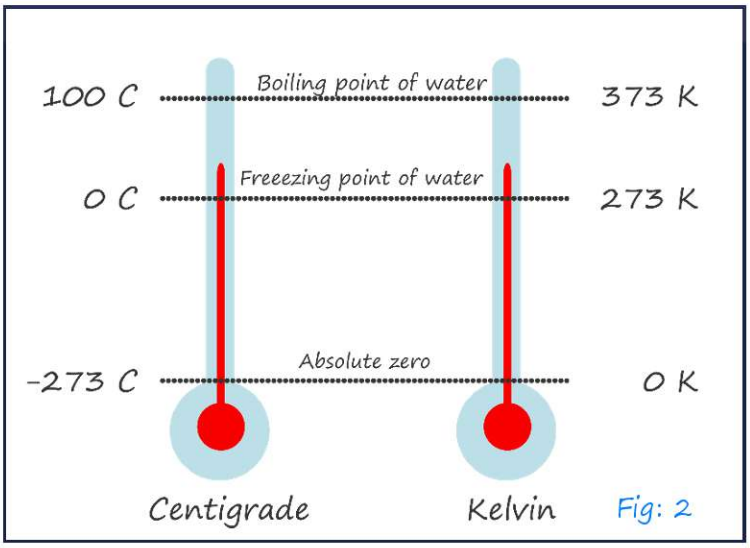
100 C
Boiling point of water
373 K
0 C
Freeezing point of water
273 K
-273 C
Absolute zero
0 K
Centigrade
Kelvin

Fig: 2

- **Most preferable scale of measurement** → Metric Scale / Cardinal scale → (Interval & Ratio scale are together called as Metric scale)
- **Least Preferable** → Nominal scale
- **Mean and SD can only be measured in** → Interval / Ratio Scales

SAMPLING TECHNIQUES

- Why do we do sampling?
- Sampling is a method that allows researchers to infer information about a population based on results from a subset of the population, without having to investigate every individual.
- Consider an example of diabetes mellitus – Suppose we do a study to find the risk factors of diabetes mellitus among patients coming to AIIMS in the year 2020
- For study purposes we can have two terms – **Study Population**, and **Study Sample**
- Population consists of all the patients coming in with diabetes mellitus to AIIMS
- Collecting data from each and every patient is difficult hence a study population is not feasible.
- Sample is any random sample of (Example: 200) patients taken up for study
- Studying a sample alone is sufficient provided, it is a true representative of the population.
- Sampling technique is the methodology of taking a sample from the population.
- There are two types of sampling techniques –
  - Random sampling (best method)/ probability sampling
  - Non-random sampling/ non-probability sampling

Random sampling techniques 00:06:51

i. Simple random sampling

ii. Systematic random sampling

iii. Stratified random sampling

iv. Multistage random sampling

v. Cluster sampling

Simple random sampling

- It is the **simplest** method.
- The best example is lottery method.
- Each and every individual has equal and non-chance of getting into the sample.
- Applicable for **small homogenous populations**.
- Maximum number of possible samples are from simple random sampling.
- Methods of simple random sampling are –
  - Lottery method
  - Random number tables
  - Computer software

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Systematic random sampling

- Sample is taken in a systematic way, Individuals are selected at regular intervals from the sampling frame
- Every **Nth person** is selected in the sample
- Complete list of individuals should be available
- The first person is chosen randomly

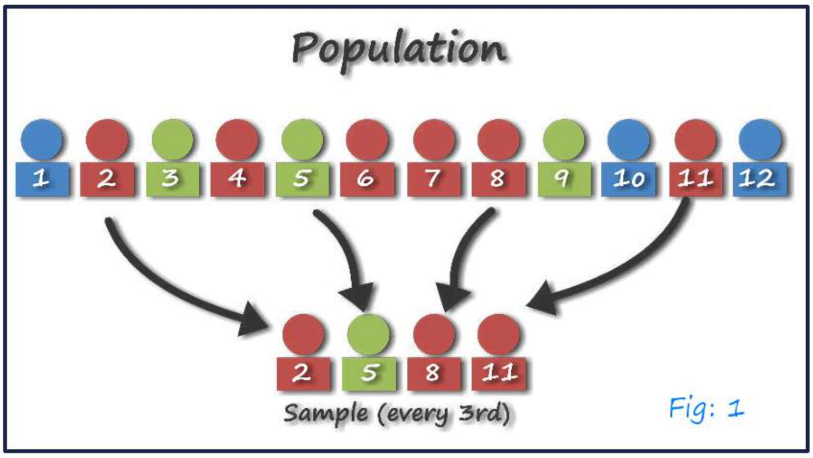
Population
1
2
3
4
5
6
7
8
9
10
11
12
2
5
8
11
Sample (every 3rd)

Fig: 1

Stratified random sampling

- The heterogeneous group is converted to homogenous strata.
- The population is first divided into subgroups (or strata) who all share a similar characteristic
- An equal number is drawn from each stratum.

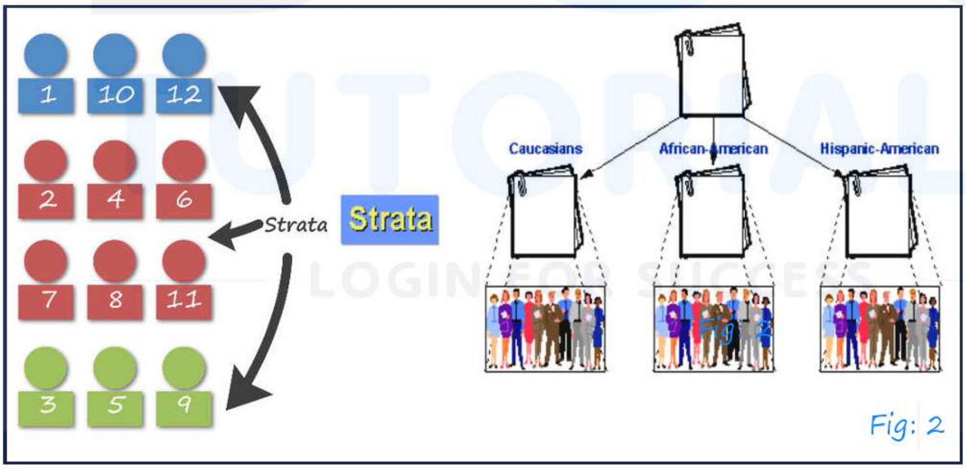
1
10
12
2
4
6
7
8
11
3
5
9
Strata
Strata
Caucasians
African-American
Hispanic-American

Fig: 2

Multistage random sampling 00:20:13

- It is done in multiple stages
- Example – Government of India is trying to find the nutritional status of school children in India. Multistage random sampling can be done

- In the first stage, the names of various states of India are written and a few are selected randomly
- In the second stage, the names of various districts of selected states are written. And some districts are randomly selected
- In the third stage, the names of various schools of selected districts are written and a few schools are randomly selected
- The final stage has random representation of school children from different parts of India

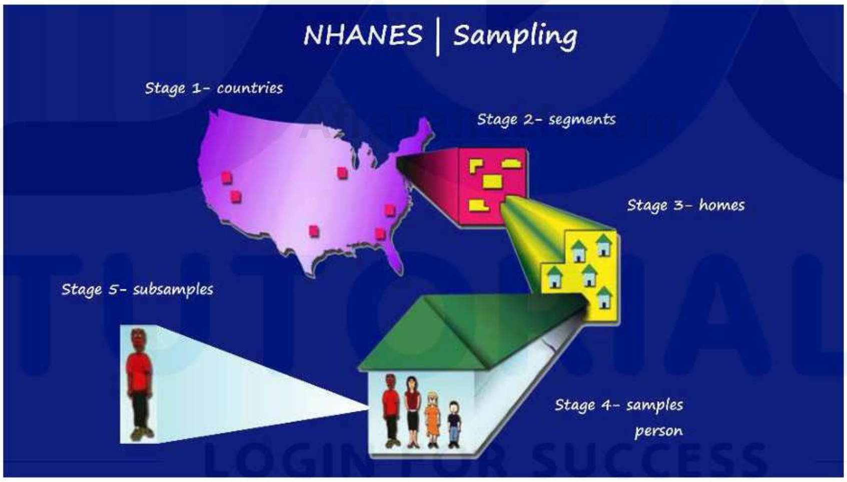
NHANES | Sampling
Stage 1- countries
Stage 2- segments
Stage 3- homes
Stage 4- samples person
Stage 5- subsamples

Fig: 3

- **Successive sampling unit** is from the previous sampling unit

Cluster sampling

- Natural clusters existing in the population are studied

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- In a clustered sample, subgroups of the population are used as the sampling unit, rather than individuals.
- Example – Immunization coverage
- It could be single stage or **two-stage sampling**
- A design effect is used in cluster sampling to calculate the effective sample size
- It is very easy to do

Non random sampling techniques 00:26:21

i. Convenience sampling
ii. Purposive sampling
iii. Quota sampling
iv. Snowball sampling

Convenience sampling

- It is done as per the convenience of the researcher
- The sample will not be a true representative of the population

Purposive sampling (Judgement sampling)

- The sample is purposely collected based on judgement.

Quota sampling

- A **percentage is fixed** for taking a sample.
- We are stratifying the population here.

- Ideally the quotas chosen would proportionally represent the characteristics of the underlying population.

Difference between stratified sampling and quota sampling 00:32:58

Stratified sampling	Quota sampling
It is done randomly	It is done on the basis of convenience
Equal number is drawn from each stratum	Percentage or quota based from each stratum

Snowball sampling

- It is used to study **hidden populations** or difficult to access population
- commonly used in social sciences when investigating hard-to-reach groups. Existing subjects are asked to nominate further subjects known to them, so the sample increases in size like a rolling snowball.
- Example - Prevalence of STD among sex workers can be done via this method
- One sex worker is selected. She will know others in the same profession, who in turn will know more and more. This is done till an adequate sample is collected for study

- The **study subject recruits' future subjects** who further recruit more subjects till the desired sample is met

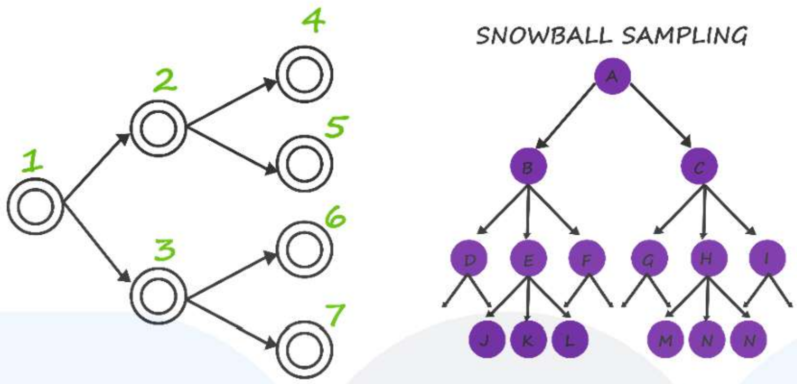
1
2
3
4
5
6
7
SNOWBALL SAMPLING
A
B
C
D
E
F
G
H
I
J
K
L
M
N
N

Fig: 4

How Compounding Works

Fig: 5

SAMPLE SIZE CALCULATION

Factors affecting sample size 00:02:38

i. Prevalence of the disease in the population

ii. Significance level / type 1 error / α-error.

iii. Type 2 error / β- error

iv. Power of study (1-β)

v. Study design/ expected effect size

vi. Precision

Prevalence 00:03:49

- As prevalence of the disease increases, the sample size decreases
- If the prevalence of a disease is 25%, 4 people are needed to perhaps detect 1 individual with disease
- If the prevalence increases to 50%, 2 people are needed to get 1 person with disease
- Conventional value for α is 5%
- Conventional value for β is 20%
- Conventional value for Power is (1-β) = 80%
- As error increases, sample size decreases
- As power increases, sample size increases

Study design 00:09:11

- There are two types of study designs:
  i. Analytical
  ii. Descriptive
- For analytical study designs, sample size is more
- For descriptive study designs, sample size is less
- As you move up the evidence pyramid, the sample size required will also increase

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Formula:

$$\boxed{\frac{(Z\alpha)^2 \times p \times q}{d^2}}$$

- **Zα (constant) = 1.96 (Critical value)**
- Constant value will be 1% when α is fixed as 5%
- As the error increases, sample size required comes down (Zα reduces)
- p is prevalence of the disease
- q is (1-p)
- d is precision
- There are two types pf precisions
  i. Relative precision (20% (B error) of prevalence)
  ii. Absolute precision: (Directly number value is given or calculated by using confidence interval)
- Now considering Z alpha ~ 2
  - The formula now becomes

$$\boxed{\frac{4pq}{D^2}}$$

Outcomes are of two types 00:16:20

i. Prevalence (% of the disease) = 4pq/d2

ii. Average value (mean)

- If the outcome is average(mean), then the formula is:

$$\boxed{\frac{4(SD)^2}{d^2}}$$

- In comparative design, **d= effect size** (= difference between outcomes)
- E.g., treatment A cure rate is 30% treatment B cure rate is 10%
- **d= 30-10 = 20**
- As effect size increases, sample size decreases.

DATA PRESENTATION

- The method by which the data is arranged, and the results presented in front of a group of audience is called data presentation.
- Data presentation can be presented in two ways -

  i. Table

  ii. Diagram/Charts
- The advantage of tables is that they can be used for all variables.
- Diagrams and charts depend on the type of variable.

Diagrams and charts 00:05:11

Fig: 1

Types of diagrams and charts

i. Bar diagram

ii. Histogram

iii. Frequency polygon

iv. Frequency curve

v. Line diagram

vi. Cumulative frequency

vii. Stem and Leaf

viii. Pictogram

ix. Spot map

x. Scatter diagram

xi. Venn diagram

xii. Decision tree

xiii. Pie diagram

Bar diagram

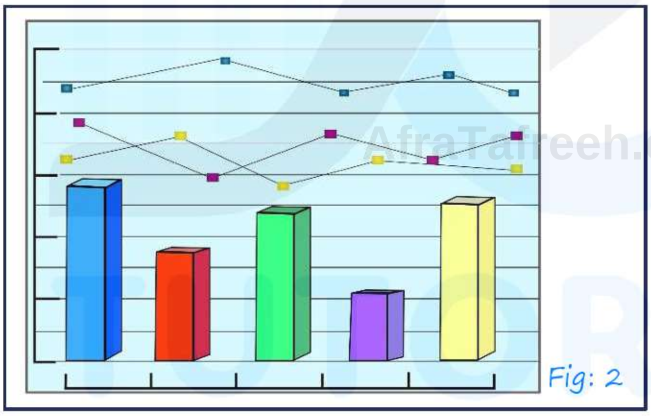

Fig: 2

- Frequency is plotted along the Y-axis and variables along the X-axis.
- The height of the bar is compared.
- There are three types of bar diagrams
  i. Simple bar diagram
  ii. Multiple bar diagram
  iii. Proportional/Component bar diagram

a. Simple bar diagram:

- Bar diagram comprises a group of equispaced and equiwidth rectangular bars for each class or category of data

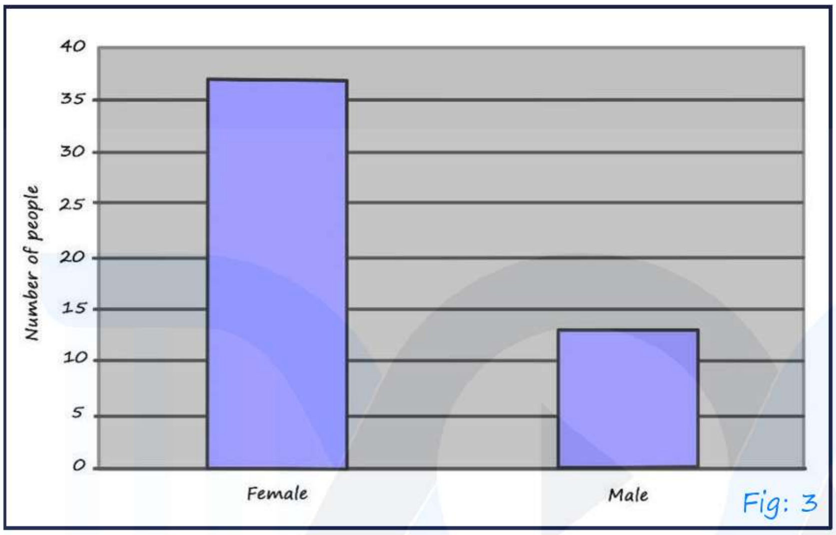

Fig: 3

b. Multiple Bar Chart

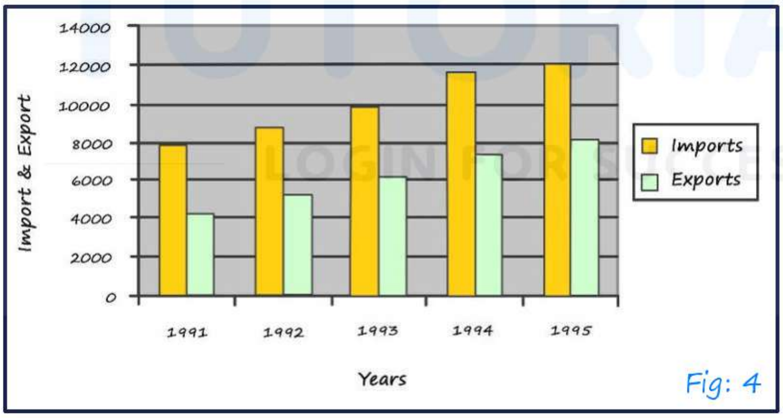

Fig: 4

- There is more than one bar joined together
- It shows relative data.

c. Component Bar Chart

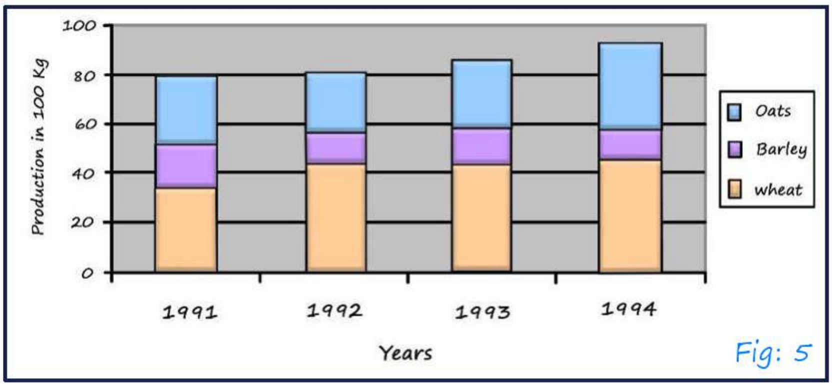

Fig: 5

- There is only one bar chart which is divided into small proportions.
- Each piece is a component in that bar.
- useful in comparing the sizes of different component parts and also fonds relationship among these integral parts

Histogram

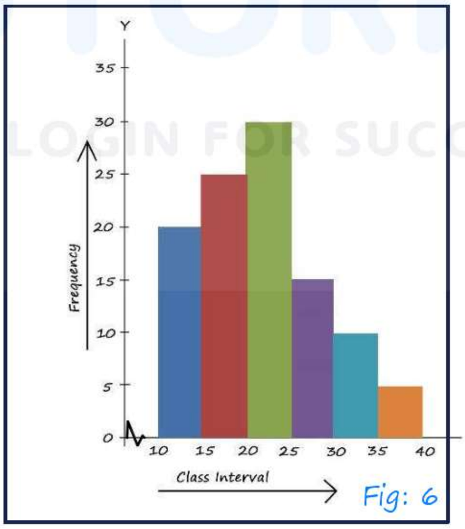

Fig: 6

- All bars are joined together without any space in between.

- It is a continuous quantitative variable along the Y axis.
- It is a two-dimensional diagram, with a set of rectangles and base as the intervals between class boundaries (along X-axis) and areas proportional to the class frequency.

Frequency polygon

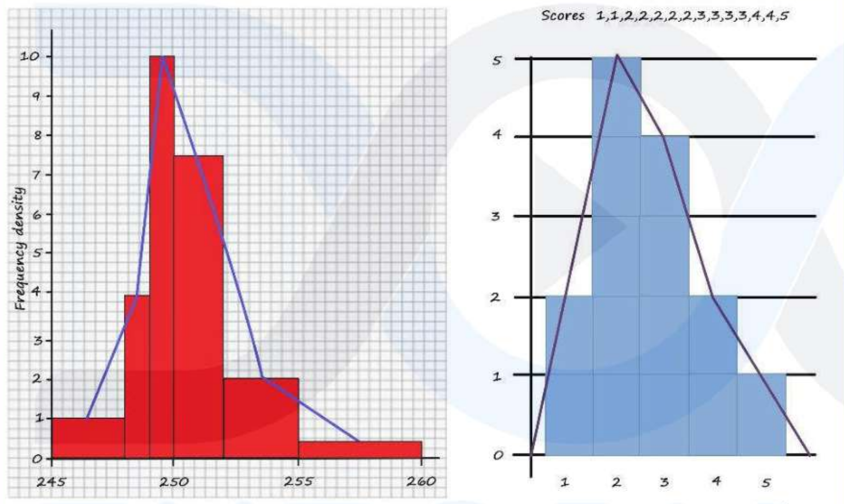

Fig: 7

- It arises from a histogram by joining the midpoints of the topside of the consecutive rectangles
- It is also for a continuous quantitative variable.
- Frequency polygon is the most
- common method of presenting grouped frequency distribution.

Frequency curve

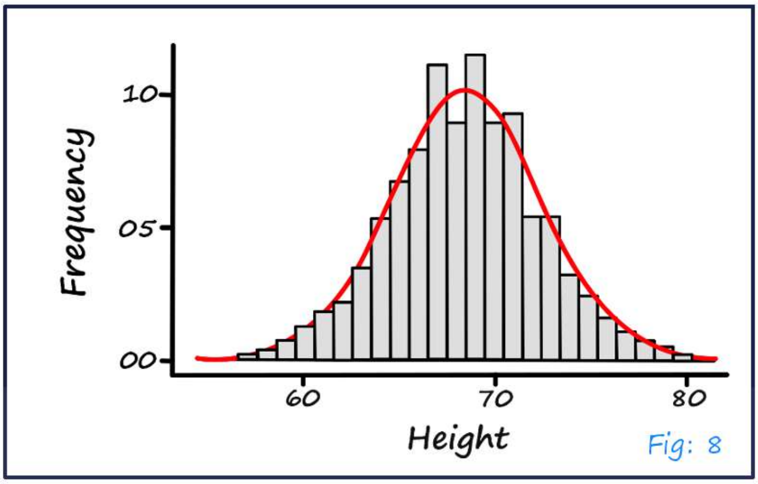

Fig: 8

- The frequency curve is obtained by drawing a smooth freehand curve passing through the points of the frequency polygon as closely as possible.
- Increase in the sample size and decrease in the class interval results in a curve like above.
- This is also a continuous quantitative variable.

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Line diagram

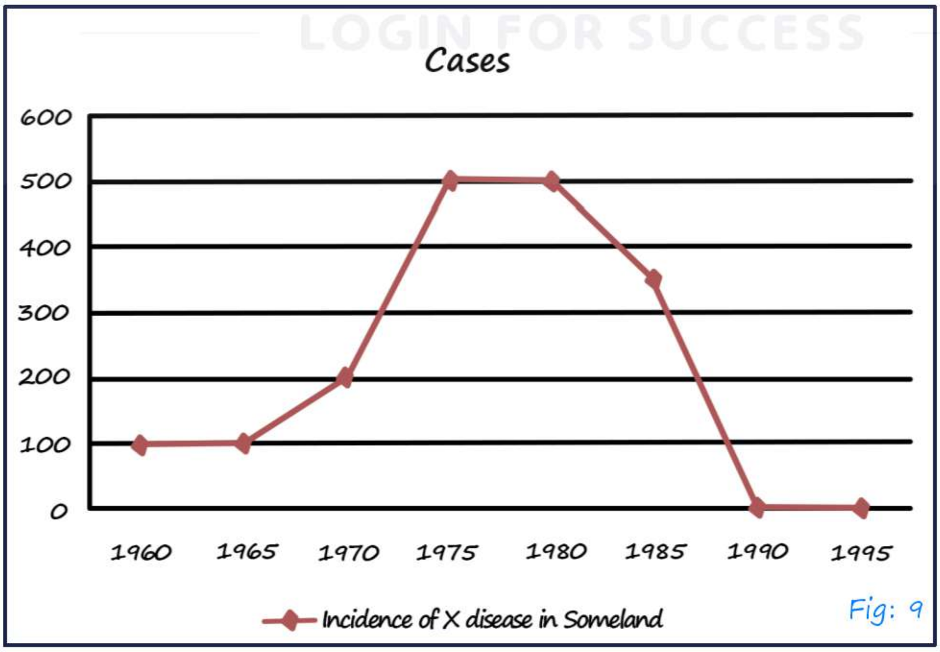

Fig: 9

- Line diagrams are used to know the trend of a disease or event.

Cumulative frequency diagram

- It is also called OGIVE
- Cumulative frequency is plotted along the Y axis against class limits of the frequency distribution

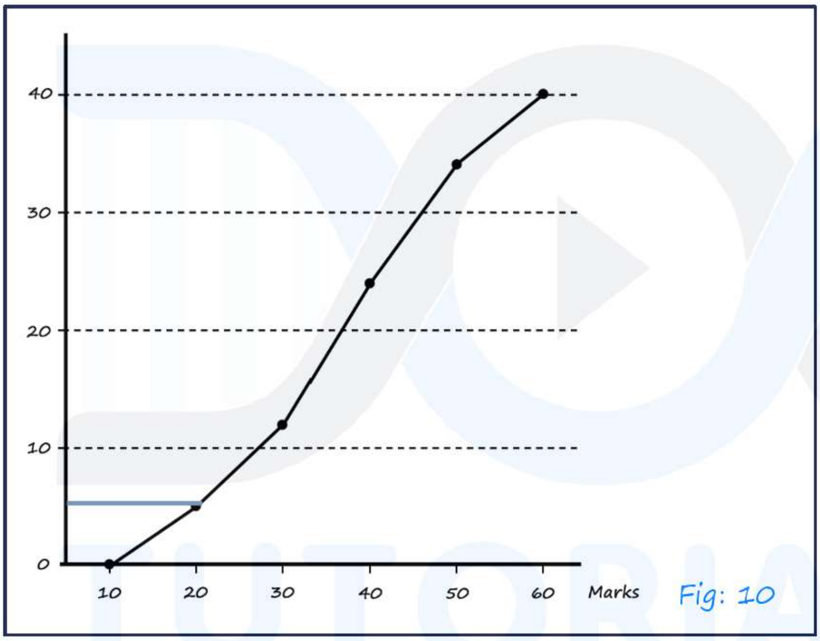

Fig: 10

- The use of cumulative frequency is that it helps us to know the number of values above and below a particular value.

Stem and leaf

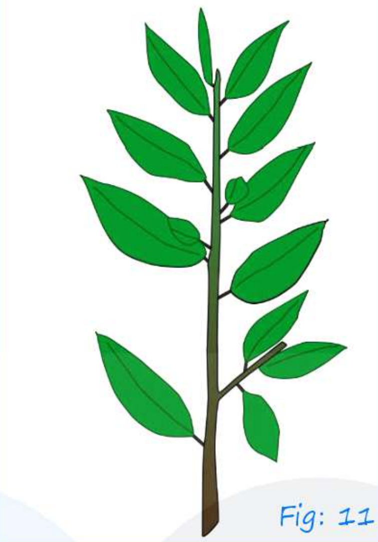

Fig: 11

- Data is divided into a stem in between and leaves on the sides.
- It is also a continuous quantitative variable.
- The first digit of class interval is the stem.
- The unit values are the leaves.
- Eg. Age of a population –

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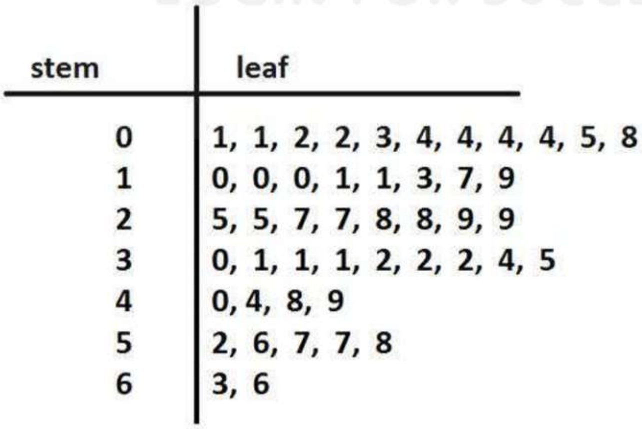
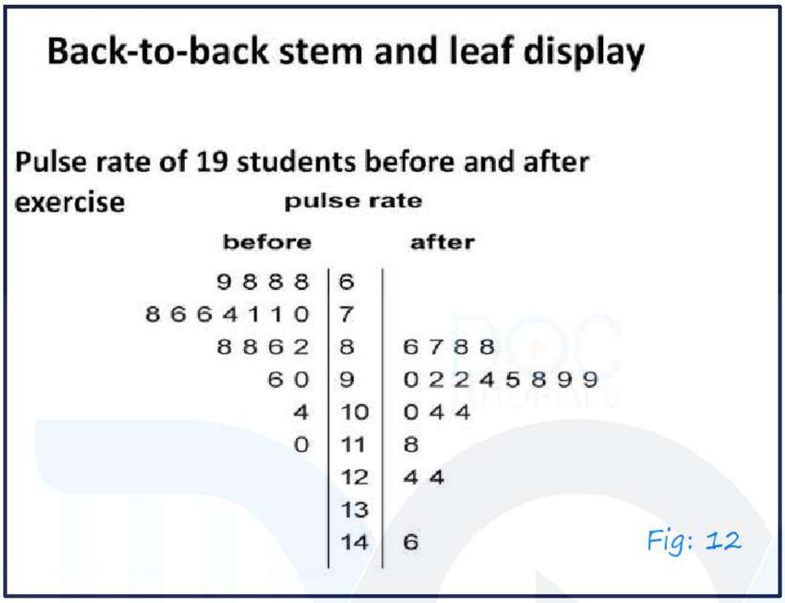


stem	leaf
0	1, 1, 2, 2, 3, 4, 4, 4, 4, 5, 8
1	0, 0, 0, 1, 1, 3, 7, 9
2	5, 5, 7, 7, 8, 8, 9, 9
3	0, 1, 1, 1, 2, 2, 2, 4, 5
4	0, 4, 8, 9
5	2, 6, 7, 7, 8
6	3, 6

Key: 6|3 = 63 years old

Back-to-back stem and leaf display

- This is to compare values before and after an intervention.



Back-to-back stem and leaf display

Pulse rate of 19 students before and after exercise

pulse rate

before		after
9 8 8 8	6	
8 6 6 4 1 1 0	7	
8 8 6 2	8	6 7 8 8
6 0	9	0 2 2 4 5 8 9 9
4	10	0 4 4
0	11	8
	12	4 4
	13	
	14	6

Fig: 12

Example of back-to-back stem and leaf

Pictogram

- This is the mode of presenting data to man in the street/conveying a message to the common man in the form of pictures.

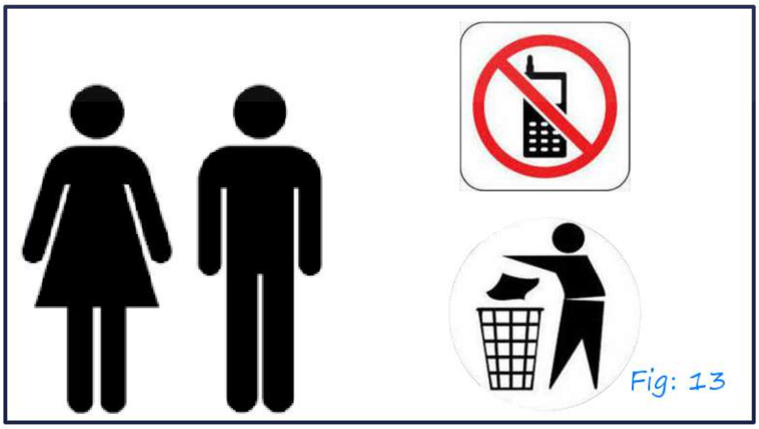


Fig: 13

Spot map

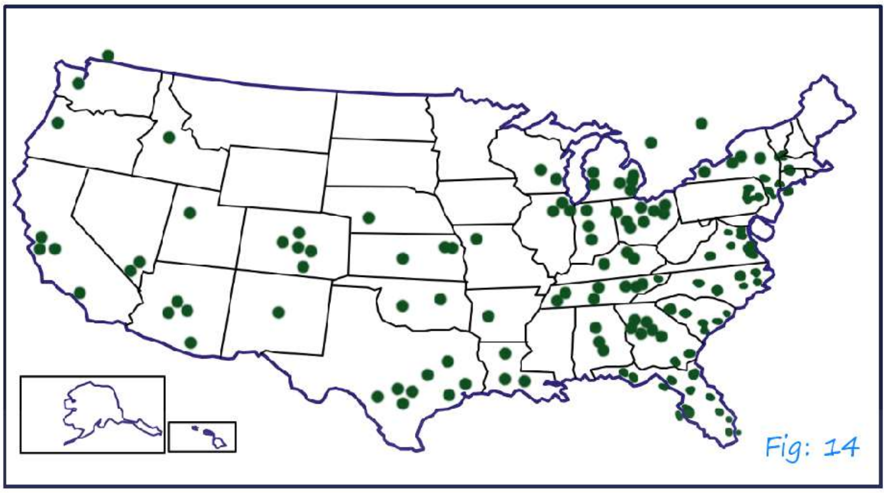


Fig: 14

- It is a map with spots.
- Each dot denotes single disease or disease frequency.
- use dots or other symbols to show where each case-patient lived or was exposed. ... A spot map is useful for showing the geographic distribution of cases, but because it does not take the size of the population at risk into account a spot map does not show risk of disease.

Scatter diagram

- To study the relation between two quantitative variables
- Along the X axis - Exposure is marked
- Along the Y axis - Outcome is marked
- The scatter diagram graphs pairs of numerical data, with one variable on each axis, to look for a relationship between them.

- If the variables are correlated, the points will fall along a line or curve. The better the correlation, the tighter the points will hug the line.

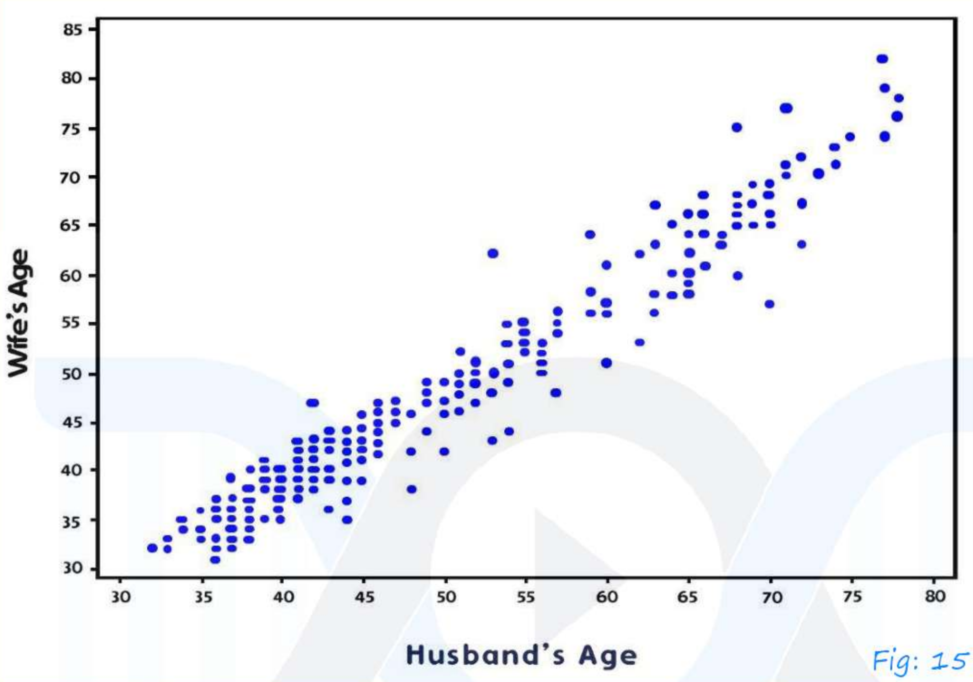


Fig: 15

Venn diagram

- Shows relation between two or more sets of data
- In two circles, the overlapping part shows what is common in both sets.

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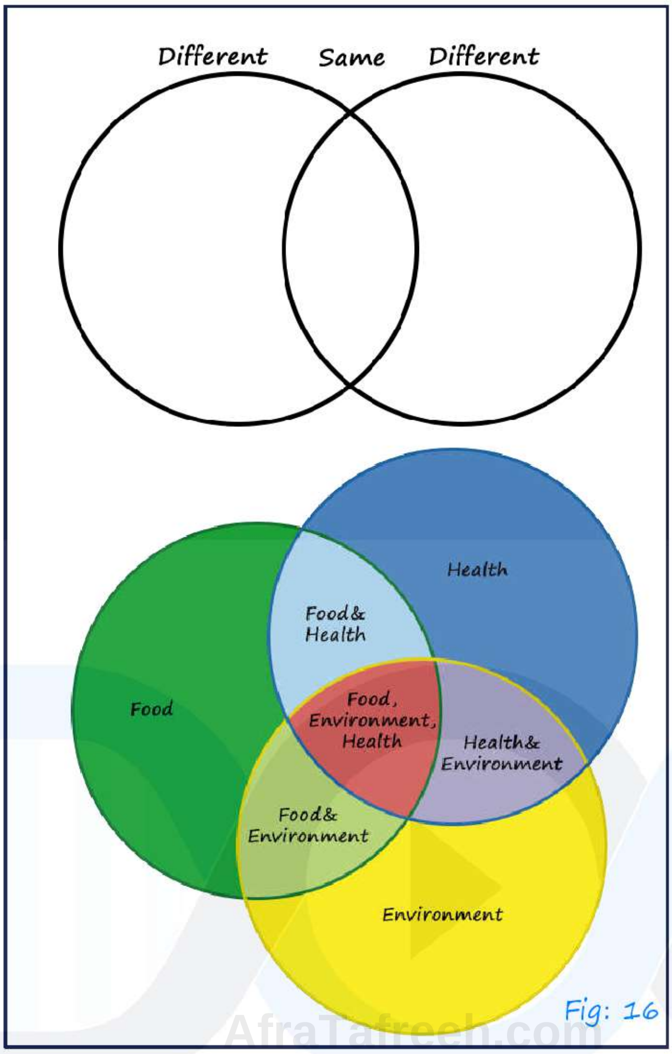
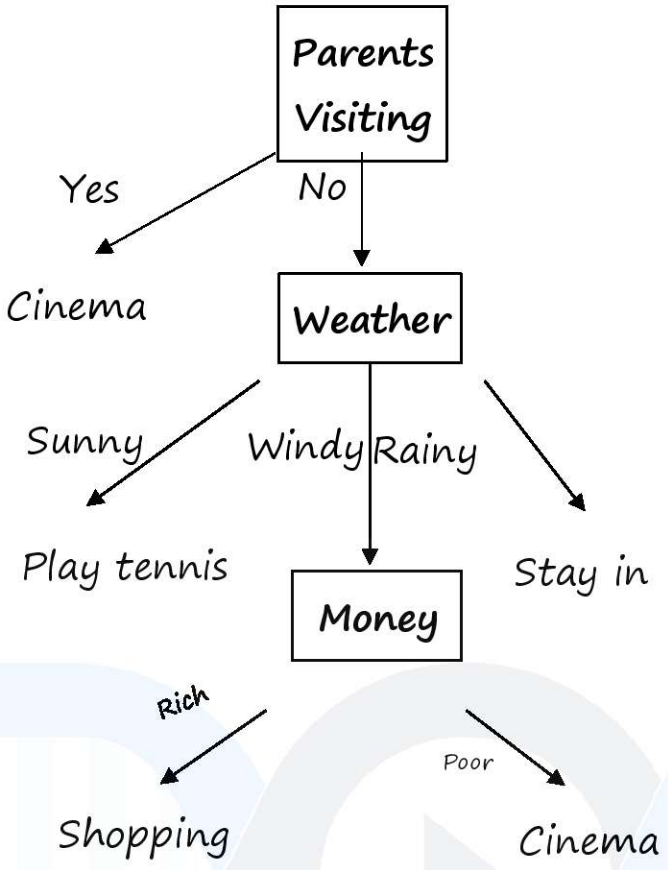

Different
Same
Different
Health
Food&
Health
Food
Food,
Environment,
Health
Health&
Environment
Food&
Environment
Environment

Fig: 16

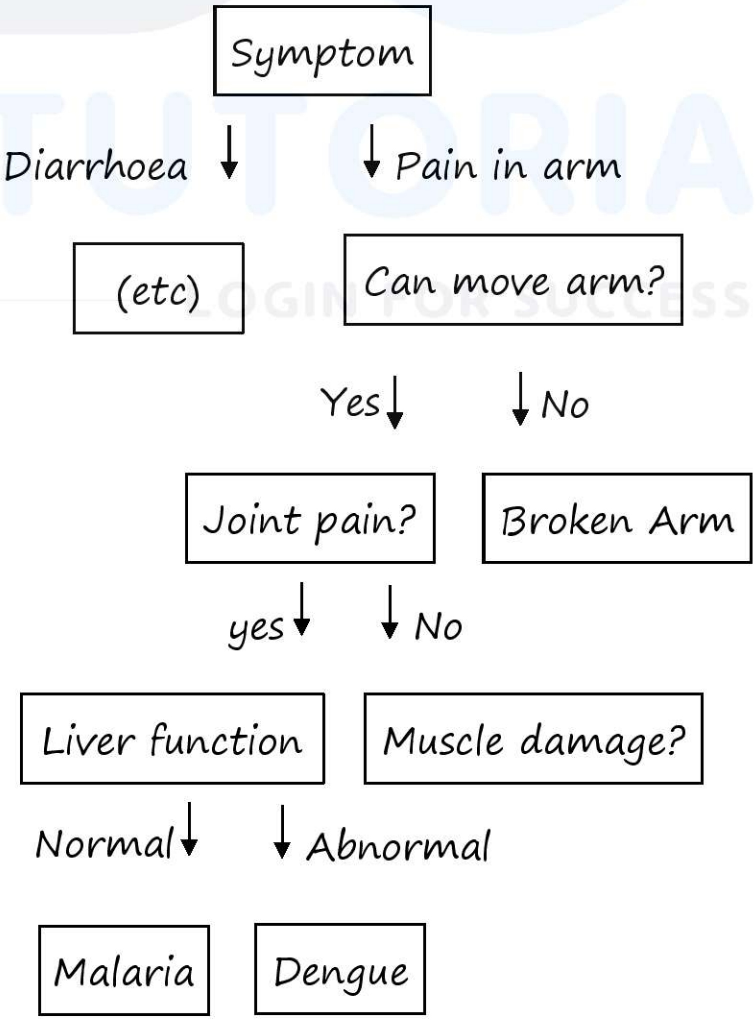
Example of Venn diagram

Decision tree analysis

- It is a tree like diagram of future probabilities
- It helps to take decisions


Parents Visiting
Yes
No
Cinema
Weather
Sunny
Windy
Rainy
Play tennis
Money
Stay in
Rich
Poor
Shopping
Cinema

- Decision algorithm


Symptom
Diarrhoea
Pain in arm
(etc)
Can move arm?
Yes
No
Joint pain?
Broken Arm
yes
No
Liver function
Muscle damage?
Normal
Abnormal
Malaria
Dengue

Pie chart

- It is used only for mutually exclusive data.
- Also, a component diagram, but unlike a bar diagram, here it is a circle whose area Is proportionally divided among the components

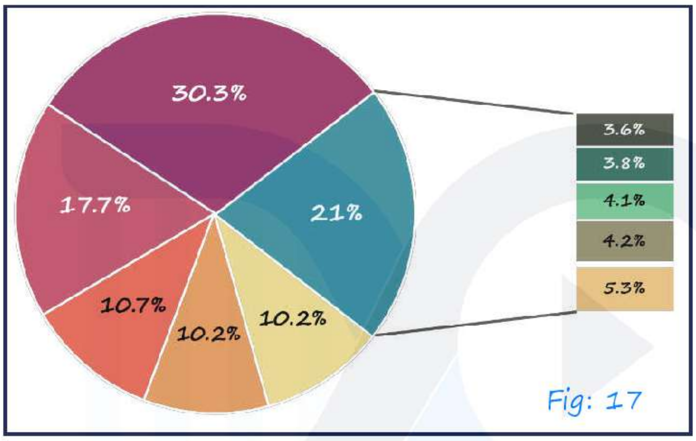


Fig: 17

MEASURES OF CENTRAL TENDENCY

FBS values of 50 MBBS students

- Central tendency is used to represent the whole data set in one single number/value by identifying the central position within that set of data.

Date Set 00:03:00

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i. The mean is equal to the sum of all the values in the data set divided by the number of values in the data set

Arithmetic Mean → $\frac{\Sigma xi}{n}$

- Extreme value → Mean has the tendency to get influenced by the extreme values in the data
- It is a non-resistant measure → as this measure cannot resist the influence of the extreme values of the data set

ii. Median

- Middle value is median
- Resistant measure
- Median = $\frac{n + 1}{2}$

iii. Mode

- Most Commonly occurring number in the data set

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Karl Pearson Formula 00:07:37

- **Mode = 3Median – 2Mean**
- Advantage of this formula is that, if the value of any two measures is known, the value of the third can be found out.
-

Type of Variable	Best measure of central tendency
Nominal	Mode
Ordinal	Median
Interval/Ratio (not skewed)	Mean
Interval/Ratio (skewed)	Median

MEASURES OF DISPERSION

- Also known as MEASURES OF VARIABILITY
- Two data sets can have the same mean but they can be entirely different. Thus, to describe data, one needs to know the extent of variability
- Measures of dispersion
  i. Range
  ii. Mean/average deviation
  iii. Standard deviation
  iv. Inter quartile range (IQR)

Range 00:02:09

- The range is the difference between the largest and the smallest observation in the data
- Highest value in the data set – lowest value in the data set = Range
  - The distance between any individual value to the mean is called as **deviation**
  - 1st deviation → $x_1 - \overline{x}$
  - 2nd deviation → $x_2 - \overline{x}$
  - Last deviation → $x_n - \overline{x}$

Average/mean deviation

→ mean of all deviations = **zero.**

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- In mean deviation we take modulus (ignoring signs)

$$\rightarrow \frac{\Sigma\,|x - \bar{x}|}{n}$$

$$\boxed{SD = \sqrt{\frac{\Sigma\,(x - \bar{x})^2}{n}}}$$

  - If **sample size is > 30**, 'n' in the denominator.

$$\boxed{SD = \sqrt{\frac{\Sigma\,(x - \bar{x})^2}{(n - 1)}}}$$

  - If **sample size is <30**, instead of 'n' in the denominator, (n-1) is taken

---

Standard Deviation 00:11:19

- Standard deviation shows the **spread of individual values in the data set around the mean**. (Average of deviation of all the individual values)
- The range is the difference between the largest and the smallest observation in the data
  - Small SD → individual values clustered around the mean
  - Large SD → individual values dispersed far away from the mean.
- **Most commonly used measure of dispersion → SD**
- $(SD)^2$ = **variance**
- SD can only be used in a **normal curve**

NORMAL DISTRIBUTION CURVE

- Normal distribution, also known as the Gaussian distribution, is a probability distribution that is symmetric about the mean

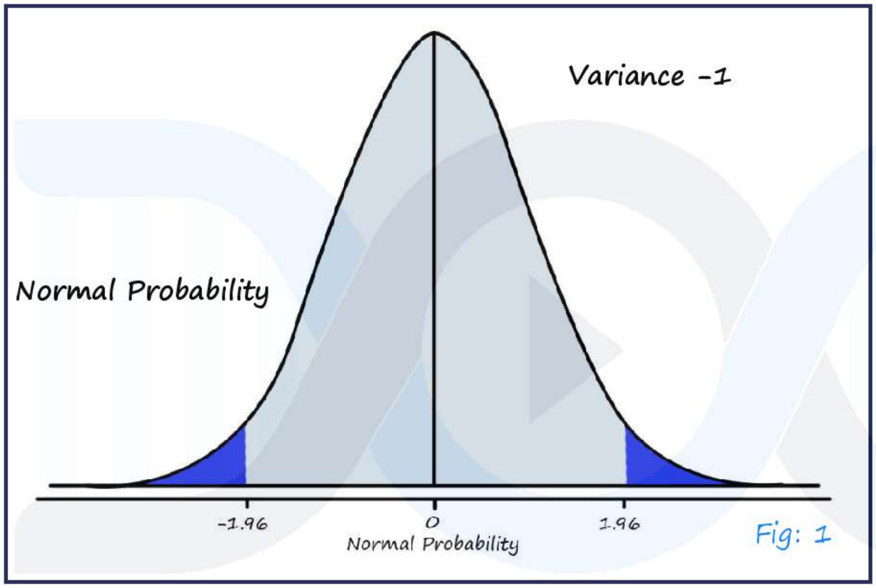


Fig: 1

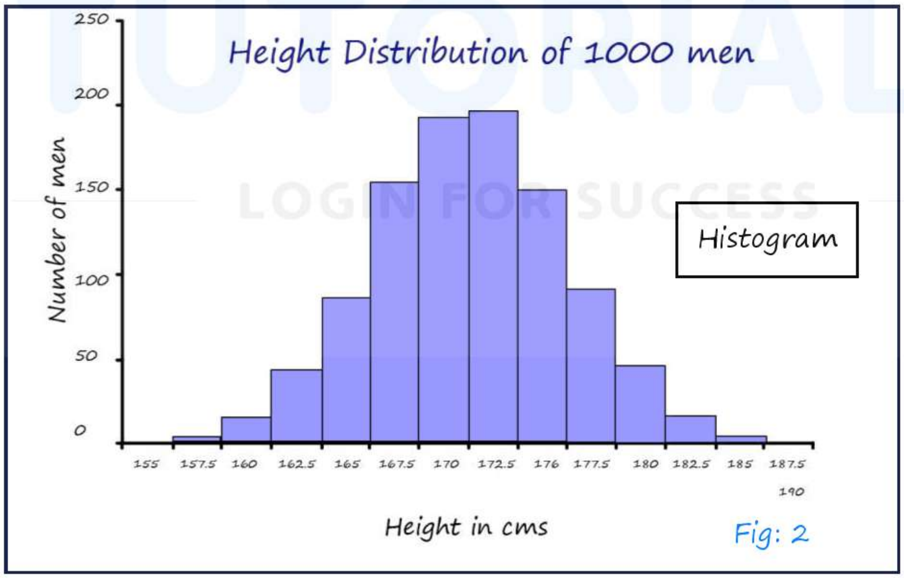


Fig: 2

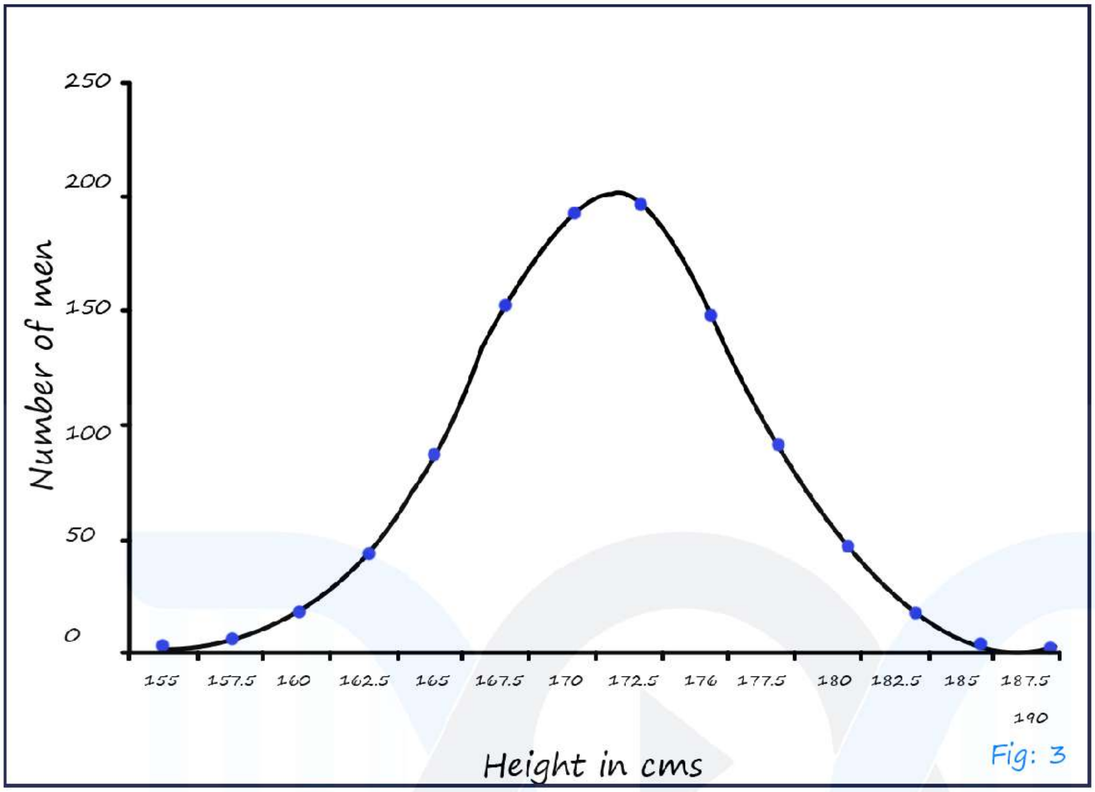
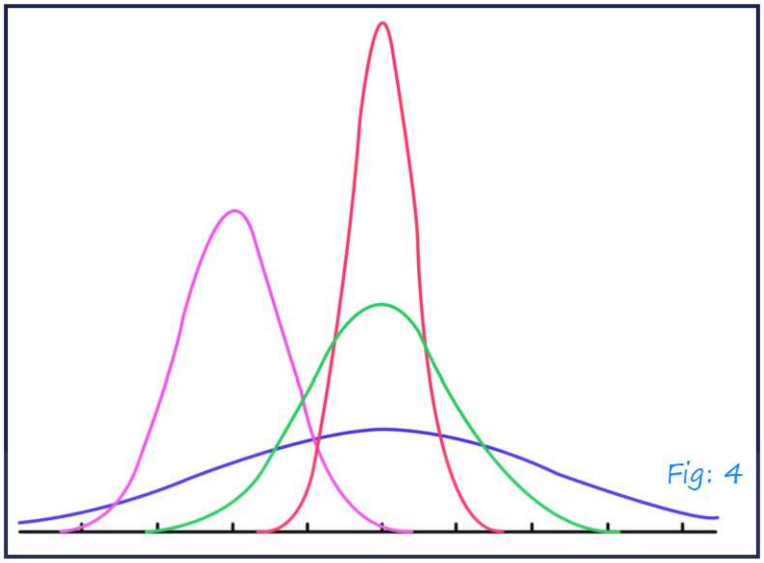


Fig: 3

Normal Curve derived from the above histogram

- In graph form, normal distribution will appear as a bell curve.
- Values that fall under the peak of the graph are **normal values.**
- Values that fall under the tail ends of the graph are often **abnormal values**
- Values that fall under the left tail are less than normal and those which fall in the right tail are **more than normal.**



- There are innumerable normal curves but, there is only one standard normal curve a.k.a Gaussian curve.

Gaussian curve 00:07:20

- A.k.a **standard normal curve.**
- Bilaterally symmetrical bell-shaped curve.
- All the measures of central tendency (mean, median and mode) fall at the center. Hence, mean=median=mode=0
- SD = 1
- Area under the curve = 1
  - Normal Curve

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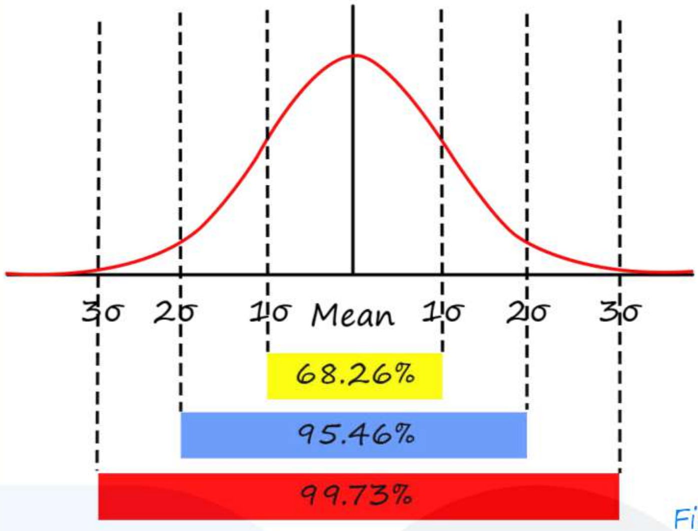

Fig: 5

- Sigma = standard deviation.
  - Mean ± 1SD = 68.26%
  - Mean ± 2SD = 95.46%
  - Mean ± 3SD = 99.73%

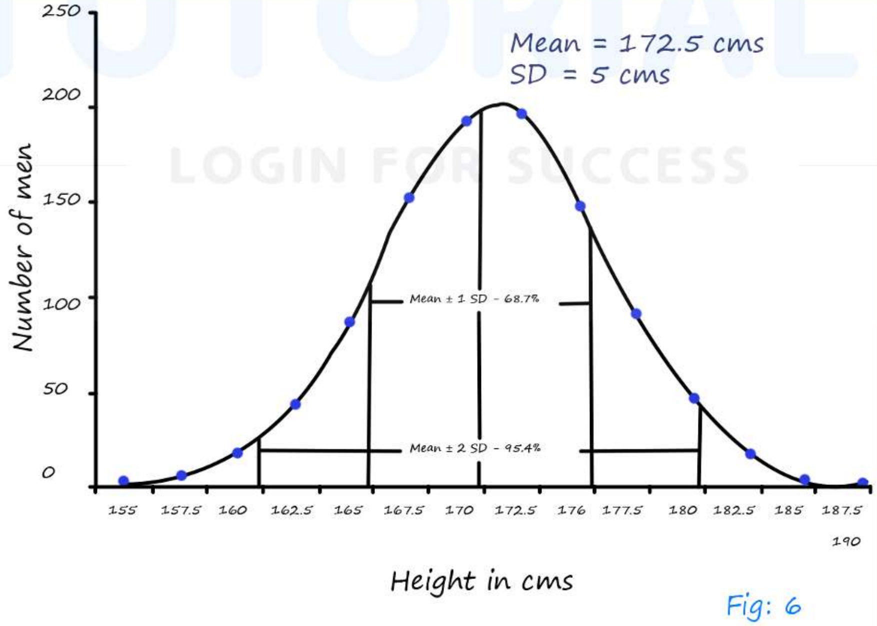

Fig: 6

- Mean = 172.5cms
- SD = 5cms
  - 1 SD, i.e., 68.26% of the population have heights ranging from 167.5cms to 177.5cms.
  - 2 SD, i.e., 95.46% of the population have heights ranging from 162.5cms to 182.5cms.
  - 3 SD, i.e., 99.73% of the population have heights ranging from 157.5cms to 197.5cms
  - Frequency distribution of IQ

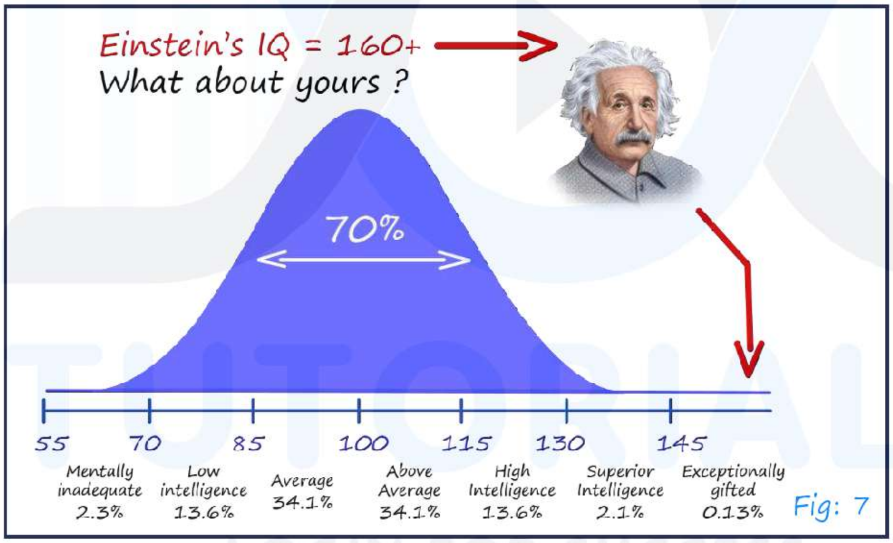

Fig: 7

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Critical values 00:14:07

- 1 SD → 68% of values
- 1.28 SD → 80% of values
- **1.64 SD** → 90% of values
- **1.96 SD → 95% of values**
- **2.58 SD → 99% of values**

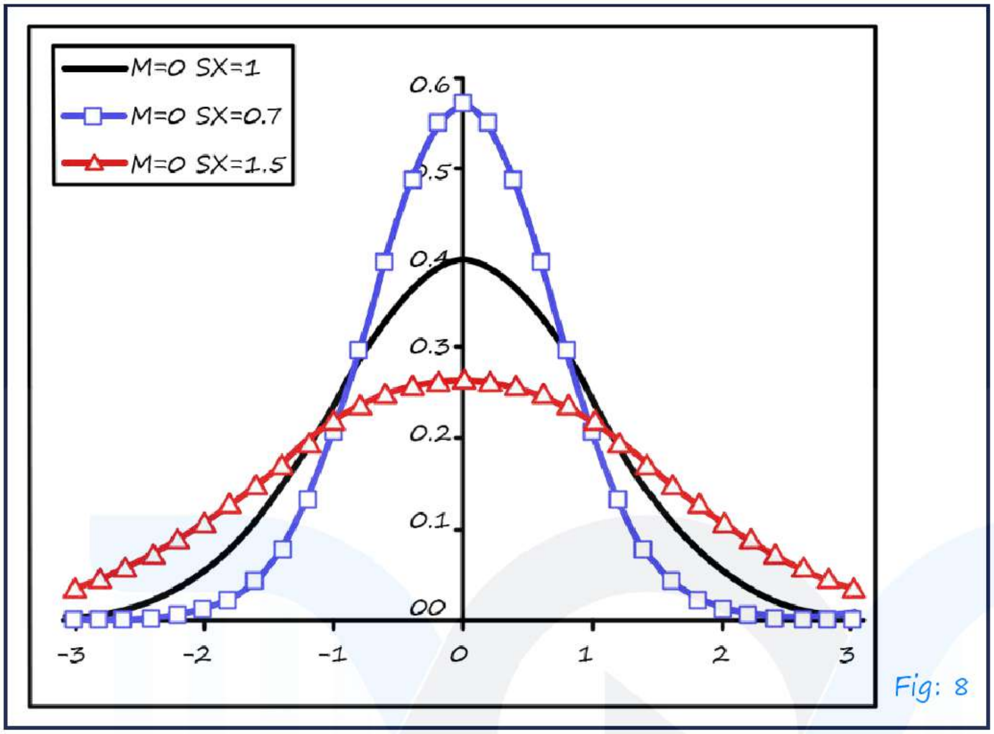


Fig: 8

- As the SD decreases, all the individual values would be clustered around the mean & the curve would be taller and vice versa.

Kurtosis 00:16:54

- **It is a measure of the "tailedness" of the probability distribution of a real-valued random variable.**
- To compare height of the normal curve with the **Gaussian curve.**
- Co-efficient of kurtosis – β_2
- Unit less

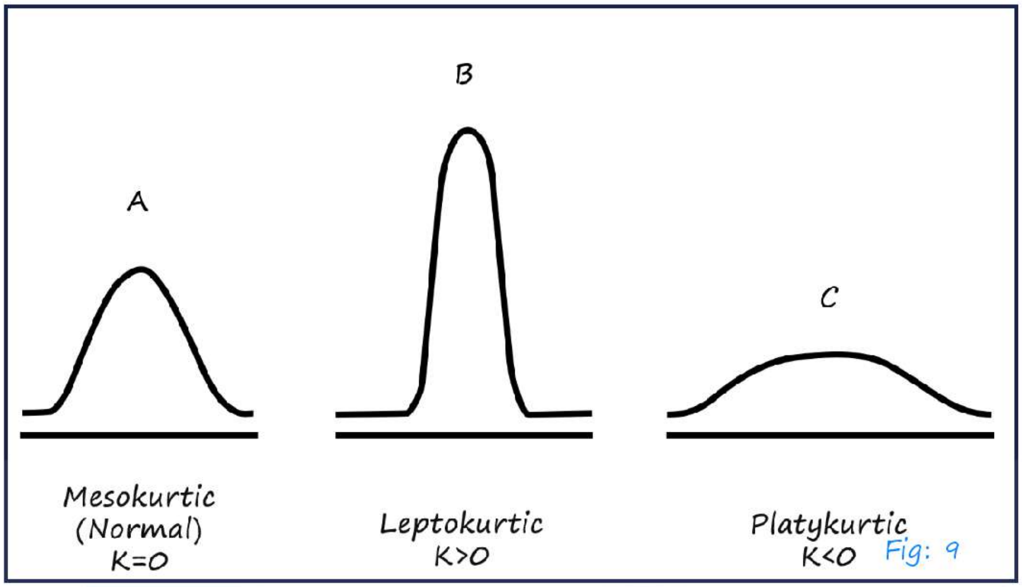

A
B
C
Mesokurtic
(Normal)
K=0
Leptokurtic
K>0
Platykurtic
K<0

Fig: 9

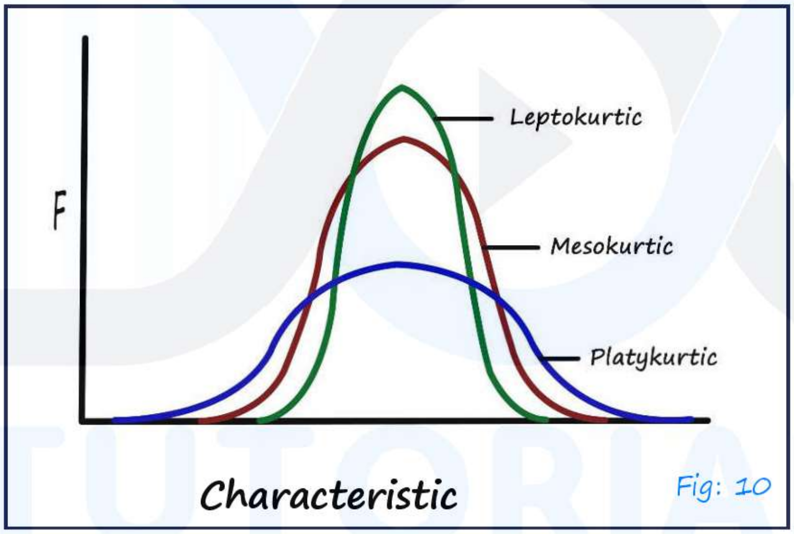

F
Leptokurtic
Mesokurtic
Platykurtic
Characteristic

Fig: 10

- Standard normal distribution has variance of 1

  (variance = $SD^2 = 1^2 = 1$)

Z-SCORE

Z – Score 00:00:24

- Also known as 'standard normal deviate'

  (Capitals, Gold, Underline)

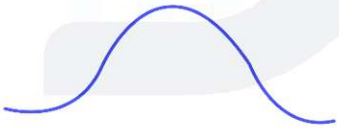
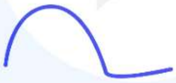
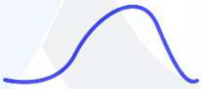
  - It gives you an idea of how far from the mean a data point is. Or how many standard deviations away from a central value

Formula 00:01:38

- Formula = Individual value – Mean/ Standard deviation (SD)
- $z = (x - \mu) / \sigma$
- Normal value = value that falls within 2 SDS
- z- score ≤ 2 → normal value
- z – score ≥ 2 → Abnormal value
- Can only be used in normal distribution.
- In order to use a z-score, you need to know the mean μ and also the population standard deviation σ.

SKEWING

- Also called as abnormal distribution
- Skewness, in statistics, is the degree of asymmetry observed in a probability distribution.
- Differences between normal & skewed

Normal Distribution	**Skewed Distribution**
Normal Peak at centre & two tails on both sides of equal length  Mean = median = mode	Abnormal (patients) Peak at one side, tail on the other side.  Mean ≠ Median ≠ Mode

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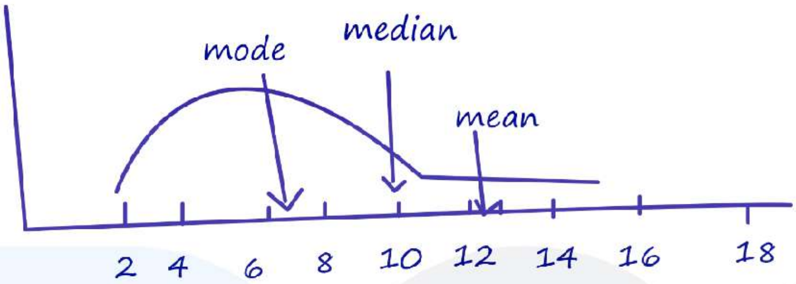
Types of skewing 00:02:17

- Distributions can exhibit right (positive) skewness or left (negative) skewness to varying degrees.
- A normal distribution (bell curve) exhibits zero skewness
- Two types of skewing

2 types → Positive (Right)
2 types → Negative (Left)

Right sided skewing 00:03:41

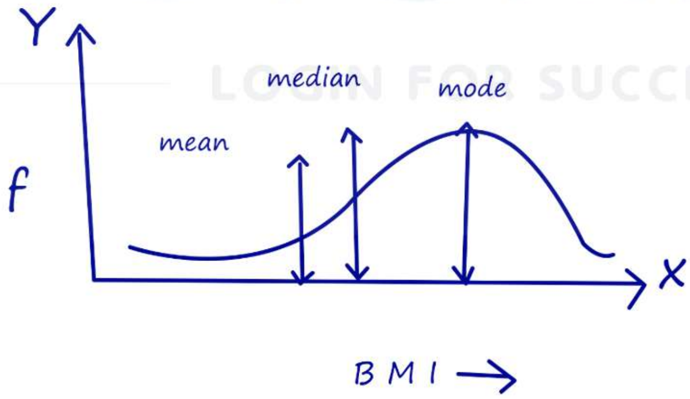
- For example, samples of hemoglobin are collected from patients with malignancy & plot a frequency curve (Y – axis) & Value of Hb in X – axis.



Mean>Median>Mode in positively skewed data

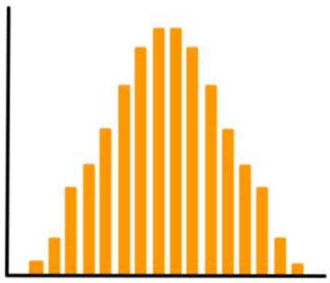
Left sided skewing 00:07:21

- Example of frequency of Y-axis & BMI of Obese patients on X-axis

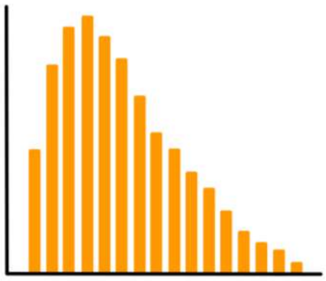


- Mean < Median < Mode in negatively skewed data

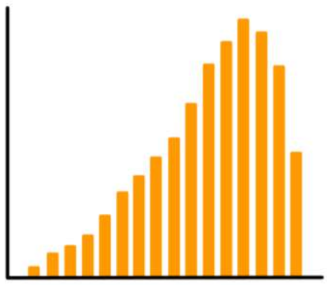
Normal distribution



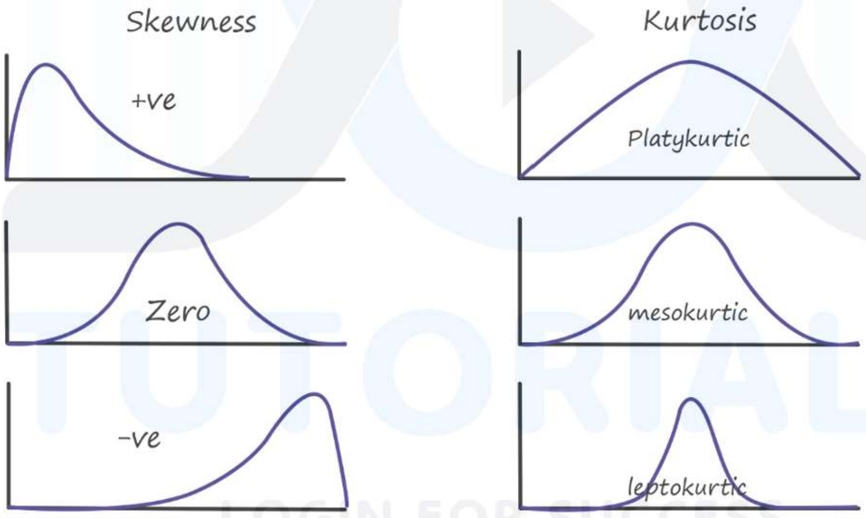
Positive skew



Negative skew



Difference between skewness & kurtossis 00:10:38


Skewness
+ve
Zero
-ve
Kurtosis
Platykurtic
mesokurtic
leptokurtic

- Skewness is used along with kurtosis to better judge the likelihood of events falling in the tails of a probability distribution.

Measure of skewness 00:12:13

- Formula for Pearson's coefficient of skewness =

$$\frac{\text{Mean} - \text{Mode}}{\text{SD}}$$

- Median is not used as it always lies in the center whether it is positive or negative skewing.

Normal V/s Skewed 00:13:40

	Normal	Skewed
i. Measure of central tendency	Mean	Median
ii. Measure of Dispersion	Standard (SD) Deviation	Interquartile range (IQR) ($Q_3 - Q_1$)

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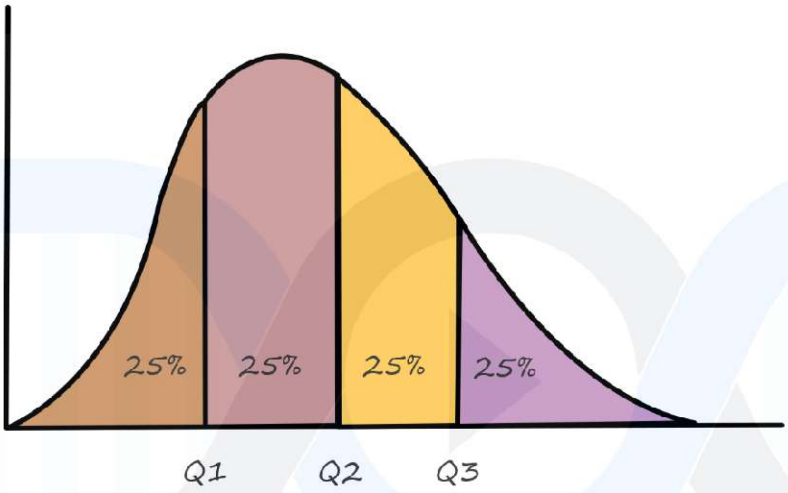
QUARTILES AND PERCENTILES

Quartiles 00:00:15

- 4 almost equal parts
- Requires 3 points



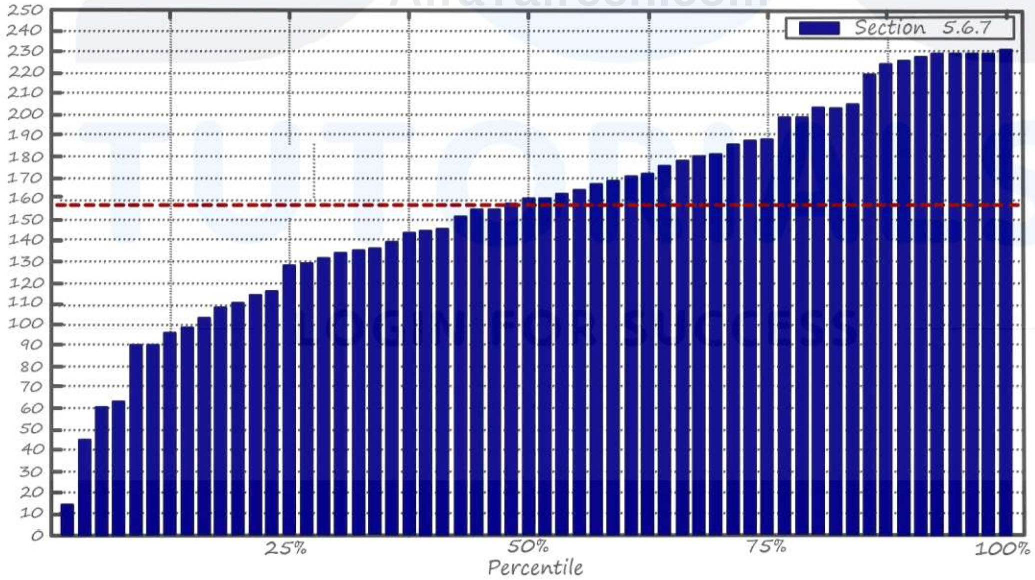
- Q1 divides data set in ratio of 1:3
- Q2 divides data it in ratio of 1:1; also called as media
- Q3 divides data set in ratio of 3:1

Inter Quartile Range 00:02:27

- Values that are present between Q1 and Q3 (or) Q3 – Q1 = inter quartile range (IQR= Q3-Q1)
- Contains 50% of the quartile values

4 equal parts	Quartile
3 equal parts	Tertile
5 equal parts	Pentile (Quintile)
6 equal parts	Henile
7 equal parts	Heptile
8 equal parts	Octile
9 equal parts	Nonile
10 equal parts	Decile
100 equal parts	Percentile

Percentile 00:05:32



- For dividing data set into 100 equal parts, we need 99 points
- Q1 25th percentile

  Q2 50th percentile

Q3 75th percentile

- 'X' percentile = X% of values are less than X
- Percentile = total mark; percentile = positional
- To calculate quartiles and percentiles, the data must be ordered from smallest to largest.
- Quartile's divide ordered data into quarters. Percentile's divide ordered data into hundredths

Value at Kth percentile 00:09:53

- n/100 x K = value in kth percentile.

BOX AND WHISKER PLOT

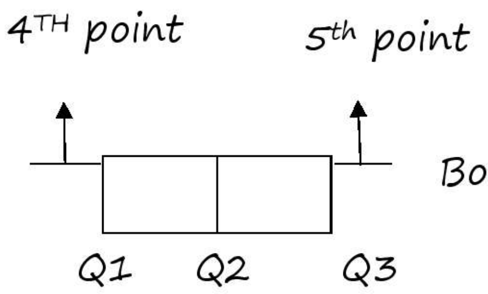
Introduction 00:00:35

- Method of presenting data distribution through their quartiles
- The lines extending parallel from the boxes are known as the "whiskers", which are used to indicate variability outside the upper and lower quartiles
- Outliers are sometimes plotted as individual dots that are in-line with whiskers
- Data can be presented horizontally and vertically
- 5-point box and whisker plot
  - 3 points – box
  - 2 points – whisker

Box and whisker plot 00:02:02

1st point	Q1	$\frac{N+1}{4}$
2nd point	Q2 (median)	$\frac{N+1}{2}$
3rd point	Q3	$(n+1)\frac{3}{4}$
4th point		Q1 – 1.5 IQR
5th point		Q3 + 1.5 IQR

- Mark Q1, Q2 and Q3 as vertical points



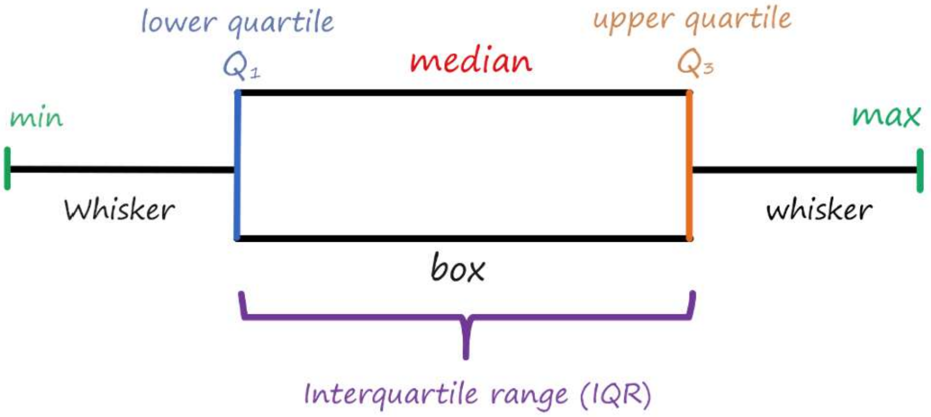
Box with 3 vertical points

- Inter quartile range (IQR) = (Q3-Q1) X 1.5 = 1.5 IQR
- Q1 -1.5 IQR = 4th point
- Q3 + 1.5 IQR → 5th point
- Skewed median = 1.5 IQR

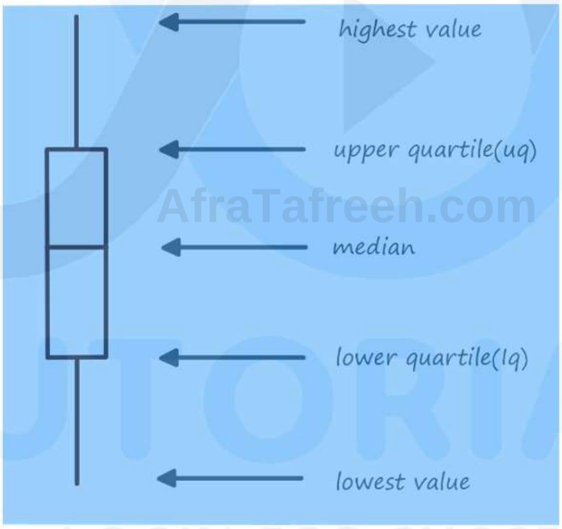
Points and quartile and percentile 00:08:48

Q1	25th percentile
Q2	50th percentile
Q3	75th percentile
4th point	3rd percentile
5th point	97th percentile

Horizontal and vertical plot 00:13:56


lower quartile
Q1
median
upper quartile
Q3
min
max
Whisker
whisker
box
Interquartile range (IQR)

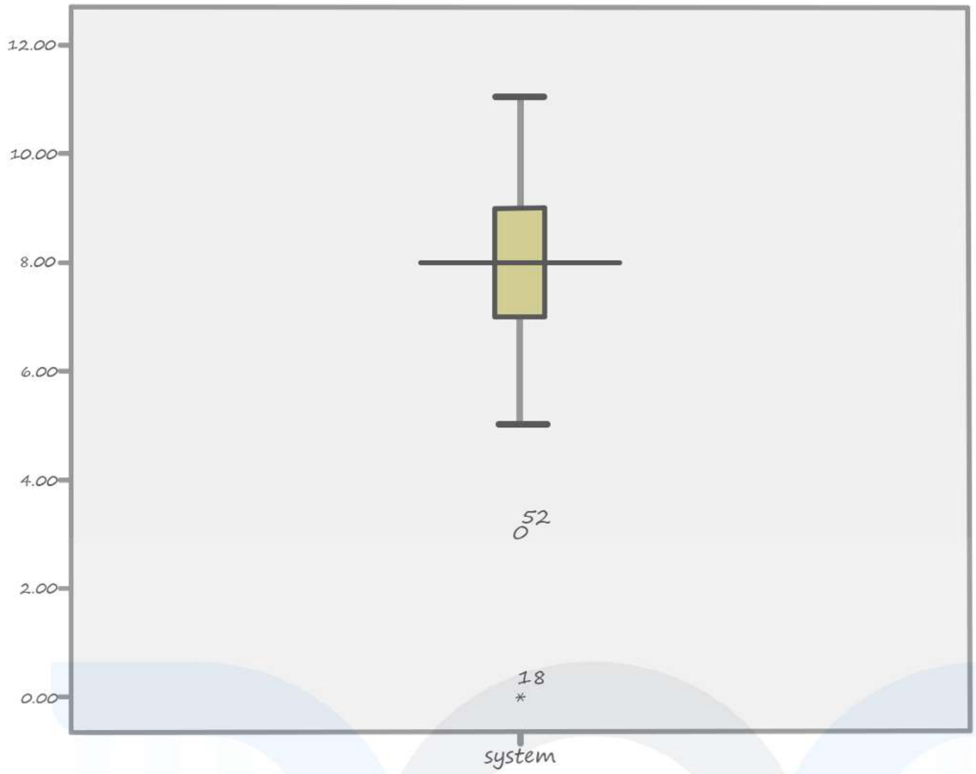
- Horizontal box and whisker plot


highest value
upper quartile(uq)
median
lower quartile(lq)
lowest value

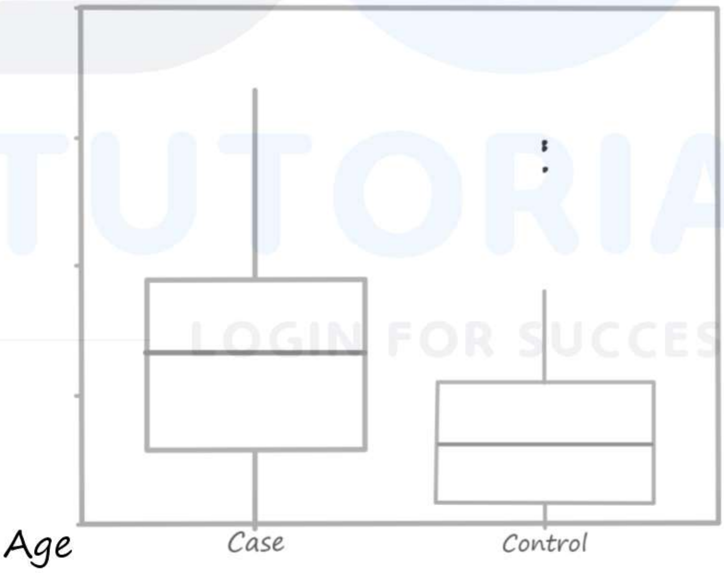
- Vertical box and whisker plot

Outlier 00:15:20

- Values which are more than 1.5 IQR are called as outlier
- Represented in a box and whisker plot ○ as a “Bubble”
- If value is >3 IQR, called as “far outlier”; represented ☆ as star



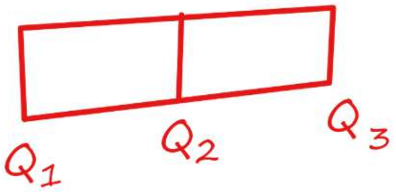
Comparisons of box and whisker plots 00:17:52



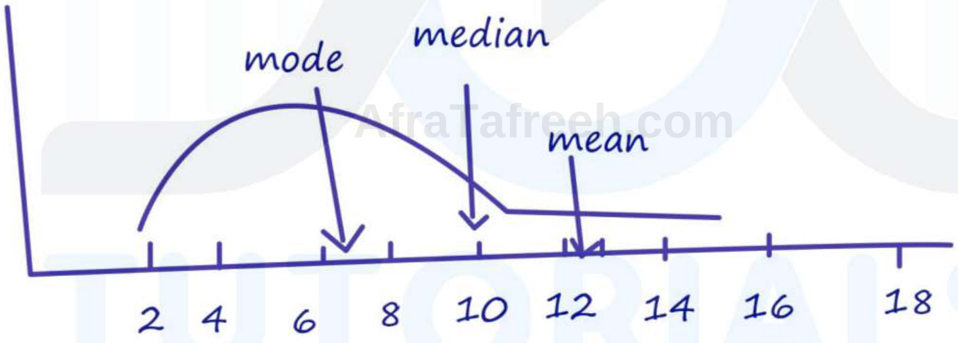
- Interpretation: Average age of cases are more than controls
- There are many outliers in controls

Box plot and skewness 00:19:57

- Normal distribution – symmetrical chart no skewing



- Right sided skew


mode
median
mean
2
4
6
8
10
12
14
16
18

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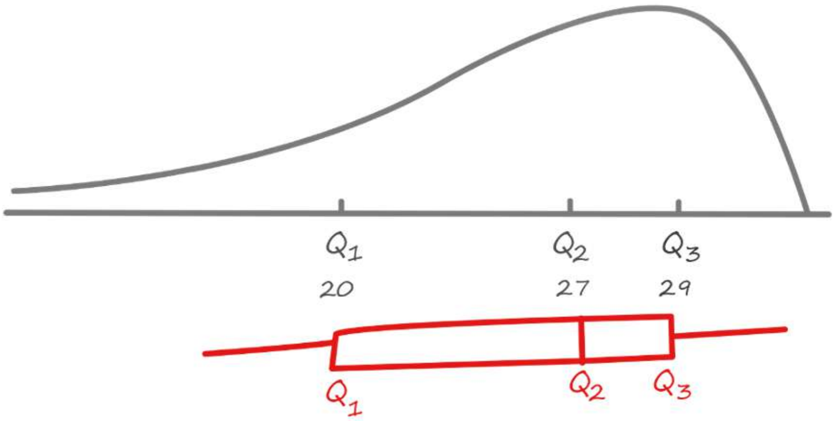
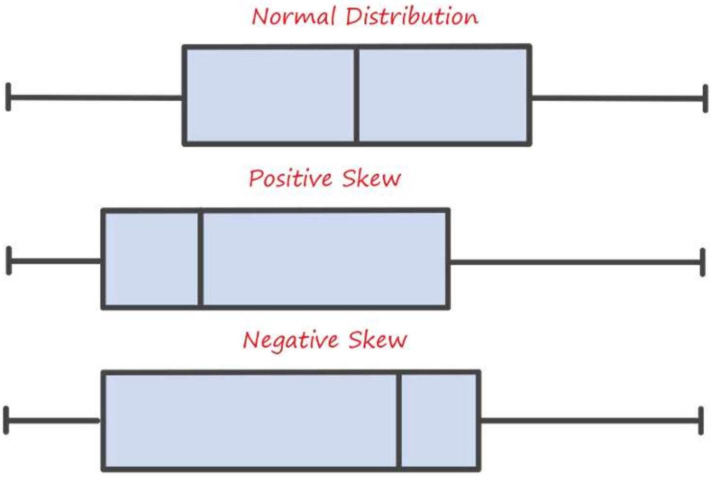
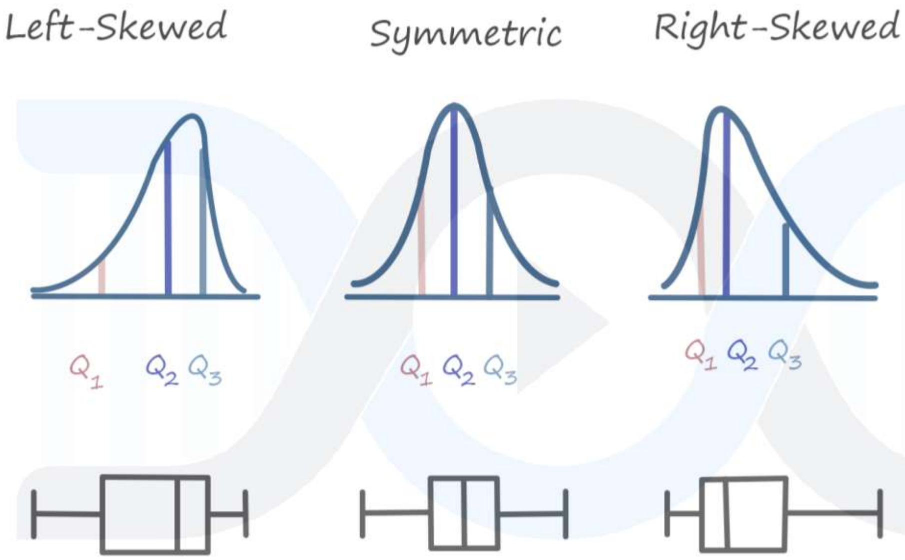
- Left sided skew


Q1
Q2
Q3
20
27
29
Q1
Q2
Q3


Normal Distribution
Positive Skew
Negative Skew


Left-Skewed
Symmetric
Right-Skewed
Q_1 Q_2 Q_3
Q_1 Q_2 Q_3
Q_1 Q_2 Q_3

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Tests for outliers 00:25:15

1.Grubb's test

2.Dixon's Q test.

TESTS OF SIGNIFICANCE

- Results: – p value
- If the p value is < 0.05 → significance Q
- A cardiologist wants to study the effect of an antihypertensive drug. He notes down the initial systolic BP (mmHg) of 50 patients and then administer the drug on them. After a week's treatment, he again measures the BP. Which is the most appropriate statistical test of significance to test the change in BP.
  - Paired 't' test
  - Unpaired 't' test
  - Analysis of Variance
  - Chi-square test
- The statistical test chosen will depend on:
  - Whether comparison is between independent or related gropus
  - Whether proportions (%) or means(averages) are being compared
  - Whether > 2 groups are being compared

Groups	Nature of Variable	Test of Significance
Two Independent groups	Percentages/Proportions Mean	Chi square test Students t test Also, k/a 2 sample z test
Two Related groups	Percentages/Proportions Mean	Mc Nemars Chi square test Paired t test→ also k/a one sample t test
More than two groups	Percentages/Proportions Mean	Chi square test ANOVA (F test/F ratio)
More than two (RELATED)	Percentages/Proportions Mean	Cochran's Q test ANOVA (F test/F ratio) (Repeated measure)

Tests of significance

Parametric test (Inferior)
↓
- Normal distribution
↓
- Student's t test
- ANOVA

NonParametric test
↓
- Any distribution
↓
- chi square
- Coctraris Q test
- MC Neymar's Chi square test

Groups	Nature of Variable	Test of Significance	Non-parametric tests
Two Independent groups	Percentages/ Proportions	Chi square test	Chi square test
	Mean	Students t test	Wilcoxan Rank sum/ Mann Whitney U test
Two Related groups	Percentages/ Proportions	Mc Nemars Chi square test	Mc Nemars Chi square test
	Mean	Paired t test	Wilcoxan Sign rank/ Sign test
More than two groups (INDEPENDENT)	Percentages/ Proportions	Chi square test	Chi square test
	Mean	ANOVA (F test/F ratio)	Kruskal Wallis
More than two (RELATED)	Percentages/ Proportions	Cochran's Q test	Cochran's Q test
	Mean	Repeated ANOVA	Friedman's test

- Parametric:
  - TAP
  - T test
  - ANOVA
  - Pearsons

Variants

- Z tests – variant of t test, sample size > 30 sample size < 30 → t test
- Fischer's test – variant of chi square test when sample size < 30
- Results…
  - P value obtained
  - Conventionally set cut-off is < 0.05
- P value
  - FP < 0.05
  - FP < 5%

  95% confident
  - True > 95%
- α error (FP) = 5% (Before study)
- β error (FN)

Null hypothesis

↓ ↓

No assumptions

Null hypothesis

- Type 1 error–Rejecting null hypothesis when it is true

  (α error)
- Type 2 error–Accepting null hypothesis when it is true

  (β error)

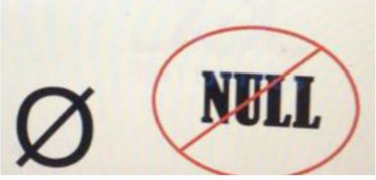

Fig: 1

α – rejecting null hypothesis – True (Type I)

β – accepting null hypothesis – False (Type II)

		Reality	
		Effective	Not effective
Trail Results	Effective	True positive (correct)	False positive (Type I Error)
	Not effective	False negative (Type II Error)	True negative (correct)

1.Type I: – Null hypothesis True (Innocent → criminal)

FP

2.Type II: – NH → False (criminal → released)

FN

Formula??

3.Formula for test of significance = $\dfrac{\text{Difference between sample values}}{\text{SE of difference between two values}}$

SE of difference b/w 2 value

– Average (mean): – SE of mean = $\dfrac{SD}{\sqrt{n}}$ – sample size

- SE of difference (mean) = $\sqrt{\frac{SD_1^2}{N_1} + \frac{SD_2^2}{n_2}}$

- SE of proportion: - $\sqrt{\frac{pq}{n}}$

- SE of differ proper = $\sqrt{\frac{p_1q_1}{n_1} + \frac{p_2q_2}{n_2}}$

1. A cardiologist wants to study the effect of an antihypertensive drug. He notes down the initial systolic BP (mmHg) of 50 patients and then administer the drug on them. After a week's treatment, he again measures the BP. Which is the most appropriate statistical test of significance to test the change in BP.
   a. Paired 't' test
   b. Unpaired 't' test
   c. Analysis of Variance
   d. Chi-square test
2. A study was undertaken to assess the effect of a drug in lowering serum cholesterol levels. 15 obese women and 15 non-obese women formed the two limbs of a study. Which test would be useful?
   a. ANOVA
   b. Students t test
   c. Chi square test
   d. Fischer's test

3 6 8 9 8 7 1
0 2 2 9 6 7 2
5 4 6 8 2 3 4
2 6 6 0 5 1 7
4 6 5 5 3 8 6
7 1 6 7 5 8 0

Fig: 2

3. An investigator wants to study the association between maternal intake of Iron supplements (yes/no) and incidence of low birth weight. He collects relevant data from 100 percent women as to the status of LBW in their new born. The appropriate statistical test that can be used is
   a. Paired ‘t’ test
   b. Unpaired ‘t’ test
   c. Analysis of Variance
   d. Chi-square test

Fig: 3

4. Height of group of 20 boys aged 10 years was 140±13cm & 20 girls of same age was 135cm±7cm. To test the statistical significance of difference in height, test applicable is
   a. ANOVA
   b. Student’s t test
   c. Chi square test
   d. Fischer’s test

Fig: 4

5.For testing the statistical significance of difference in heights of school children among three socioeconomic groups, the most appropriate statistical test is

a. ANOVA

b. Students t test

c. Chi square test

d. Fischer's test

6.Square root of p1q1/n1 + p2q2/n2 is a measure of

a. Mean

b. SE of difference between two means

c. SE of difference between two proportions

d. Normal deviate

TYPES OF DISTRIBUTION

Types of distribution 00:00:13

1.Binomial distribution
2.Uniform distribution
3.Poisson distribution

Binominal distribution 00:02:15

- A distribution where only two outcomes or values are possible.
- Eg: Status of patient after treatment-dead, alive, Likewise In a exam passed or failed
- Also known as Bernoulli's distribution of experiment

Uniform distribution 00:02:55

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- The outcome of the event is almost same every time it happens, the probability of occurrence of the outcome is almost uniform or same
- Eg. X units of electricity consumed in a day in your house is uniform
- (Probability is uniform or same, also known as rectangular distribution)

Poisson distribution 00:05:12

- Probability of number of events occurring in a fixed period of time.
- Usually get when studying rare events

CHI SQUARE TEST

Introduction 00:00:20

- Test of significance
- Compares 2 samples
- Used when outcome variable is given as percentage or proportion
- Association between 2 qualitative variables
  - Eg- cases-ca lung: %
  - Control- without Ca Lung: %
  - We apply chi square test here

Formula of CHI square 00:03:41

$$\chi^2 = \frac{\Sigma\,(\text{observed} - \text{Expected})^2}{\text{Expected}}$$

	Died	Survived	Total
Control (placebo)	10	25 (71%)	35
Experiment	5	60 (93%)	65
Total	15	85	100

	Died		Survived		Total
	Observed	Expected	Observed	Expected	
Control (placebo)	10 (0)		25 (0)		35
Experiment	5 (0)		60 (0)		65
Total	15		85		100

- Expected value = $\frac{\text{Raw total x column total}}{\text{Grand total}}$

- In the above example
- Row total = 35
- Column total = 15
- Grand total = 100

	Died				**Total**
	O	E	O	E	
Control (Placebo)	10	$\frac{35\times15}{100}$	25	$\frac{35\times85}{100}$	35
Experiment	5		60	65	
Total	15		85	100	

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	Died		Survived		Total
	Observed	Expected	Observed	Expected	
Control (Placebo)	10 (o)	$\frac{35\times15}{100}$ $= 5.25$	25 (o)	$\frac{35\times85}{100}$ $= 29.75$	35
Experiment	5 (o)	$\frac{65 \times 15}{100}$ $=9.75$	60 (o)	$\frac{65 \times 85}{100}$ $= 55.25$	65
Total	15		85		100

CHI square calculation 00:09:58

- χ^2 Value of first cell

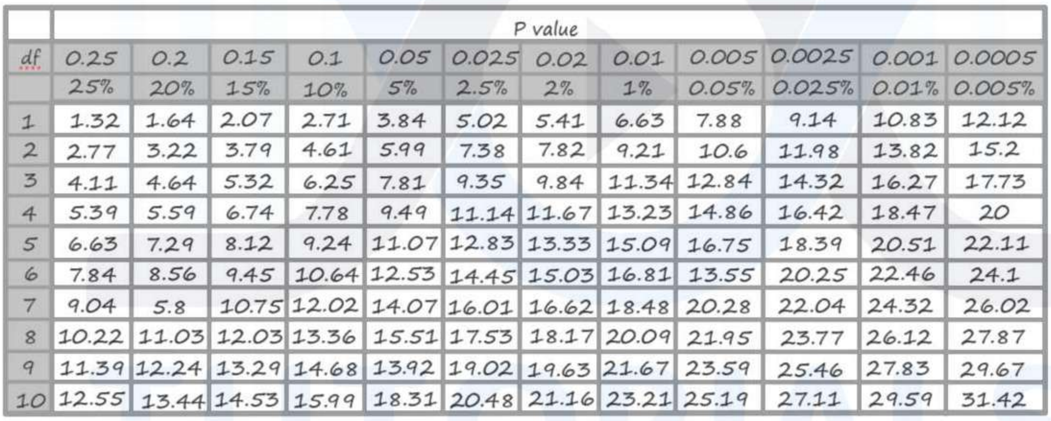
  $(10-5.25)^2/ 5.25$

  $=22.5625/5.25$

  $= 4.2978$

P value table 00:10:55

- If p value <0.05 it means your test is statistical significant



	P value											
df	0.25	0.2	0.15	0.1	0.05	0.025	0.02	0.01	0.005	0.0025	0.001	0.0005
	25%	20%	15%	10%	5%	2.5%	2%	1%	0.05%	0.025%	0.01%	0.005%
1	1.32	1.64	2.07	2.71	3.84	5.02	5.41	6.63	7.88	9.14	10.83	12.12
2	2.77	3.22	3.79	4.61	5.99	7.38	7.82	9.21	10.6	11.98	13.82	15.2
3	4.11	4.64	5.32	6.25	7.81	9.35	9.84	11.34	12.84	14.32	16.27	17.73
4	5.39	5.59	6.74	7.78	9.49	11.14	11.67	13.23	14.86	16.42	18.47	20
5	6.63	7.29	8.12	9.24	11.07	12.83	13.33	15.09	16.75	18.39	20.51	22.11
6	7.84	8.56	9.45	10.64	12.53	14.45	15.03	16.81	13.55	20.25	22.46	24.1
7	9.04	5.8	10.75	12.02	14.07	16.01	16.62	18.48	20.28	22.04	24.32	26.02
8	10.22	11.03	12.03	13.36	15.51	17.53	18.17	20.09	21.95	23.77	26.12	27.87
9	11.39	12.24	13.29	14.68	13.92	19.02	19.63	21.67	23.59	25.46	27.83	29.67
10	12.55	13.44	14.53	15.99	18.31	20.48	21.16	23.21	25.19	27.11	29.59	31.42

Chi square not used 00:11:47

- Sample size – <30 Cannot be used – Fischer's tract test is used
- If expected cell value <5 chi square test cannot be used

Yates correction for continuity 00:13:31

- If we will use chi square test for cell values <5, then we will overestimate the chi square value. But the solution is by doing yates correction

$$\Sigma = \frac{([O - E] - 0.5)^2}{E}$$

	Died		Survived		Total
	Observed	Expected	Observed	Expected	
Control (placebo)	10 (o)	5.25 (E)	25 (o)	29.75 (E)	35
Experiment	5 (o)	9.75 (E)	60 (o)	55.25 (E)	65
Total	15		85		100

- χ^2 Value of first cell without yate's correction

$$\frac{(10 - 5.25)^2}{5.25} = \frac{22.5625}{5.25} = 4.2978$$

- With yate's correction

$$\frac{(|10 - 5.25| - 0.5)^2}{5.25} = \frac{18.062}{5} = 3.44$$

- Continue the same for other cells
- 2nd cell-0.8475, with yates correction 0.607
- 3rd cell-2.3140, with yates correction 1.85
- 4th cell -0.4083, with yates correction 0.326

- Total chi square value without yate's correction = $4.2976 + 0.8475 + 2.3140 + 0.4083 = 7.7783$
- Total chi square value with yate's correctio = $3.44 + 0.607 + 1.85 + 0.3265 = 6.227$

Second formula 00:16:22

- 2 x 2 table
- Short cut calculation of chi square test

a	b	a + b
c	d	c + d
a + c	b + d	a + b +c d = N

$$\frac{(ad - bc)^2 \times N}{(a+c)\,(b+d)\,(a+b)\,(c+d)}$$

- χ^2 Value with yates correction $\frac{(|ad - bc| - N/2)^2 \times N}{(a+c)\,(b+d)\,(a+b)\,(c+d)}$

DEGREES OF FREEDOM

Introduction 00:00:27

- Number of observations in a data set that has the freedom to choose/change its value
- Degree of freedom for 'n' number of observations = (n-1)
- If a data set has two samples n1 & n2 then
  D of = (n1 + n2) - 2
- Three samples
  D of = (n1 + n2 + n3) – 3

C – Column

- Table <

R – Rows

Total cells = C x R

- Degree of freedom = (C-1) x (R-1)

PROBABILITY

Introduction 00:0021

- Chance of occurrence of an event
- Calculate probability when there is a possibility of >1 outcomes
- To calculate probability before the event occurs
- Probability ranges from 0-1| 0% - 100%|
- Formula = $\frac{\text{Way to get a particular outcome}}{\text{Total possible outcomes}}$
- Probability applies to large numbers- called as law of large numbers
- Eg: If you roll 2 dice, what is the probability of getting a 5

Dice1	Dice2	Getting a 5
1	4	5
2	3	5
3	2	5
4	1	5

- P=4/36=11%

Probability rules 00:13:20

- Rule of addition – Probabilities are added for mutually exclusive/dependent events $P(\text{Total}) = P(A) + P(B)$
- Eg Probability of a girl child born in first delivery
- Rule of multiplication – Probabilities are multiplied for joint occurrence/independent events $P(\text{Total}) = P(A) \times P(B)$
- Eg Probability of a boy child having blood group A to be born in first delivery
- In addition – OR is used $P(A \text{ or } B) = P(A) + P(B) = P(\text{Total})$
  - In multiplication → 'AND' is used $P(A \text{ and } B) = P(A) \times P(B) = P(\text{Total})$
  - For above eg:
  - (Probability of either a boy or a girl born in a delivery= add)
  - If $=1/2+1/2=1$
  - (Probability of a boy born and having a blood group A in a delivery= Multiply)
  - In % - 50%X50%
  - If $=1/2 \times 1/2 = ¼$
- Rule of subtraction (Complement of an event)
  Eg: Mr X getting a rank <500 is P(A)=75%
  Probability of not getting a rank <500 is P (A')=100-P(A)= 25%
- Rule of condition (Conditional probability)
  - An event has already occurred that affects the remaining probability

Fig: 1

- Eg: 6 cricket balls offered to 2 people Mr. X & Mr Y
- In the above example if Mr. X first chose sa ball, then the probability of Mr Y choosing a white ball would depend on the first event by Mr X
- If Mr X choose a red ball , then probability of Mr Y choosing a white ball is =3/5
- If the first ball chosen was white, then what is the probability of 2nd to ball to be choosen is also white=2/5
- If you want to write it – what has happened first will go to denominator and, what will happen next or second comes to numerator)
- P (W/R) = 3/5
- P (W/R') = 2/5
- R' means its complement of R /Its not red
- Numerator – What is going to happen
- Denominator – What happed first
- W – White ball R – Red ball R^1 – its not red/it's a White ball chosen first

CO-EFFICIENT OF VARIATION

Introduction 00:00:21

- Also known as Relatives standard deviate
- Useful to compare changes in two different variables
- Hence it is unit free
- COV = $\frac{SD}{Mean}$ X 100
- Eg- Horlicks increases height, strength and intelligence
- 100 children divided in 50 each
- 1st Group- measured, change in weight after 3 months
- COV (Wt)= SDwt/Mean wtX100
- 2nd Group- measured, change in height after 3 months
- COV(Ht)= SDHt/Mean Htx100
- Interpretation: COV Wt=30%, COV Ht=10%
- Definite increase in Weight & Height, but change in wt is 3 times higher than change in Ht.

Application in medical field 00:06:27

- Example NSAID
    - Anti-pyretic
    - Anti-inflammatory
    - Analgesic

- COV can be used to find out each property's COV & prescribe accordingly

LIKELIHOOD RATIO

Introduction 00:00:15

- Defined as the probability & its application in the form of likelihood ratio
- Gives an idea about the disease chances whether it increases or decreases compared to the previous probability when a screening test is found positive or negative
- LR-Tells how much a test result will change the odds of having a disease

Types 00:02:15

- Types of likelihood ratio (LR)

LR positive **LR negative**

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Formula $\text{LR} = \frac{\text{Sensitivity}}{1\text{-Specificity}}$

Sensitivity = True positive (TP)

Specificity = True Negative (TN)

1-Specificity = False positive (FP)

LR+ positive = $\frac{\text{TP}}{\text{FP}}$

- E.g., - Mr X -> FBS as screening tool - (140mg%) - TP or FP
- Only 90% those with DM will give FBS >126 i.e., TP or sensitivity
- 15% without DM can give FBS >126 i.e., FP
- LR for FBS= 90/15=6
- It means Mr X has got 6 times chance of having disease or TP rather than FP

Application 00:06:38

- Can be used to predict the probability of actually having the disease if the prevalence of disease is known and you are positive for the screening test & if you know the likelihood ratio of the test
- Pre-test probability = Equivalent or almost is equivalent to prevalence of the disease
- Post-test probability = Positive predictive value

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Relationship between odds & probability 00:10:01

- Odds = $\frac{P}{1-9}$ (P – Probability of occurrence of an event)
- Probability = $\frac{\text{Odds}}{1 + \text{odds}}$
- Pre-test's odds = $\frac{\text{Pre-test probability}}{1 - \text{Pre test probability}}$
- Pre test probability → Prevalence

- Pre-test odds x LR = Post test odds
- $\frac{\text{Post-test odds}}{1 + \text{Post-test odds}}$ = Post-test probability (or) Positive predictive value

Nomogram 00:12:57

- First step is to draw a straight line between pre test probability & likelihood ratio
- Second step extend the straight line & point it touches the post test probability line is the positive predictive value
- In the given example of nomogram below
  - Pre-test probability = 41
  - Likelihood ratio = 10
  - Post-test probability = 91

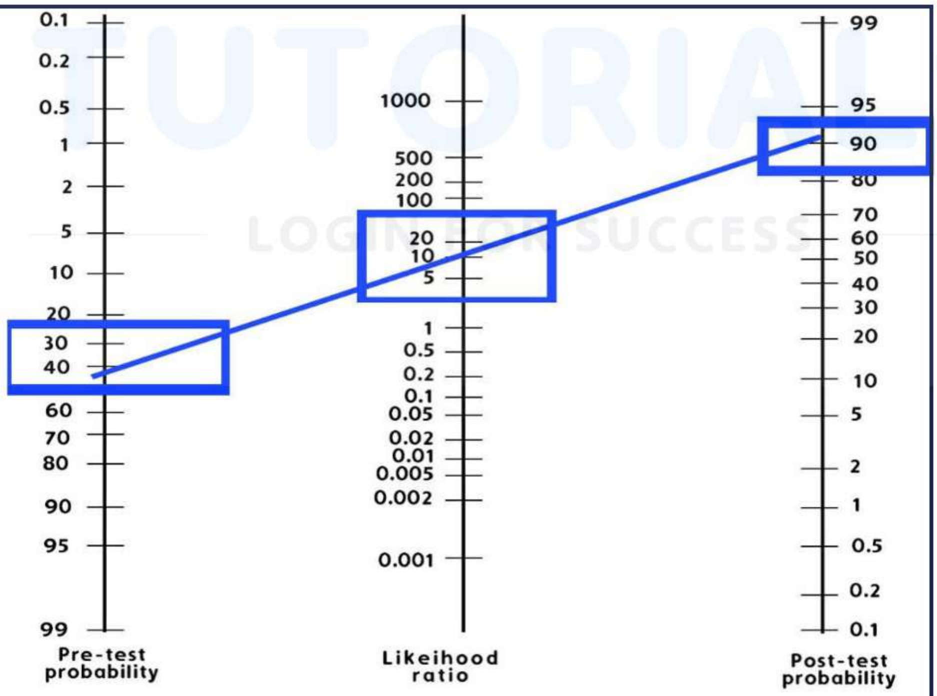

Fig: 1

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- If the likelihood ratio >1, PPV is more than prevalence
- LR < 1, PPV < Prevalence
- LR = 1, PPV = Prevalence

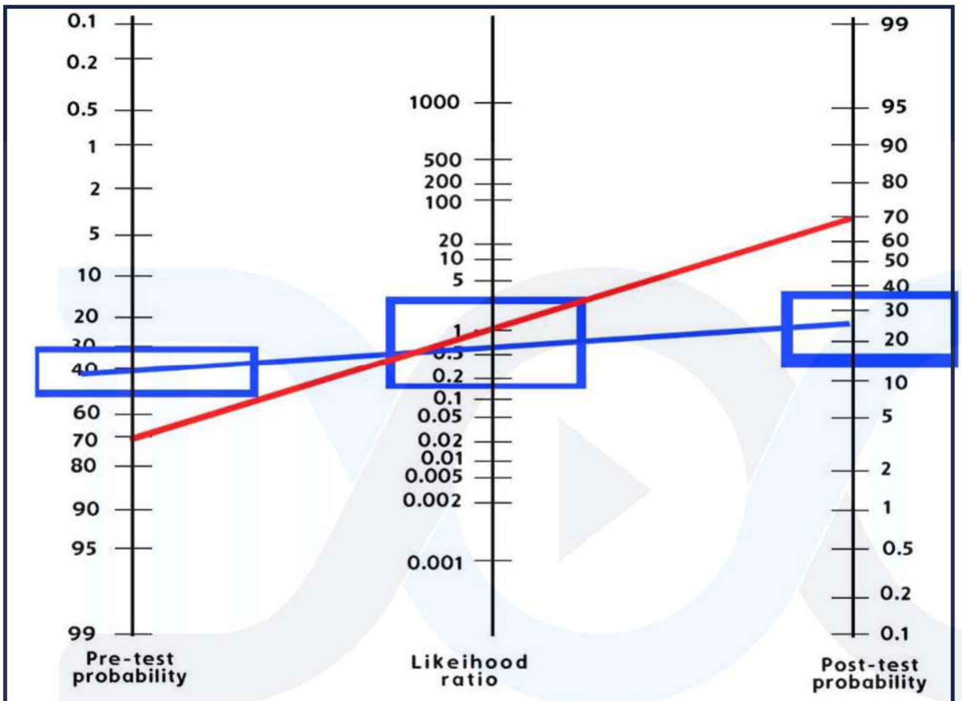

0.1
0.2
0.5
1
2
5
10
20
30
40
60
70
80
90
95
99
Pre-test probability
1000
500
200
100
20
10
5
1
0.5
0.2
0.1
0.05
0.02
0.01
0.005
0.002
0.001
Likeihood ratio
99
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1
Post-test probability

Fig: 2

DOT TUTORIALS LOGIN FOR SUCCESS

Likelihood ratio negative 00:17:51

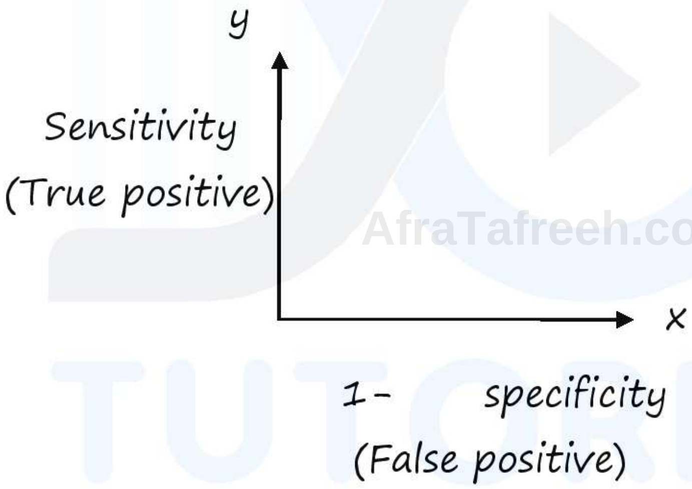
- Likelihood ratio negative is how much the odds of disease will decrease, when you found in the test as negative
- Formula = $\frac{1 - \text{Sensitivity}}{\text{Specificity}}$

ROC CURVE

Introduction 00:00:22

- Full form Receiver operator characteristic curve
- Used for screening & diagnostic tests
- Graphical representation of two parameters of test.
  i. Sensitivity
  ii. 1- specificity

Axis for ROC curve-


y
Sensitivity
(True positive)
x
1- specificity
(False positive)

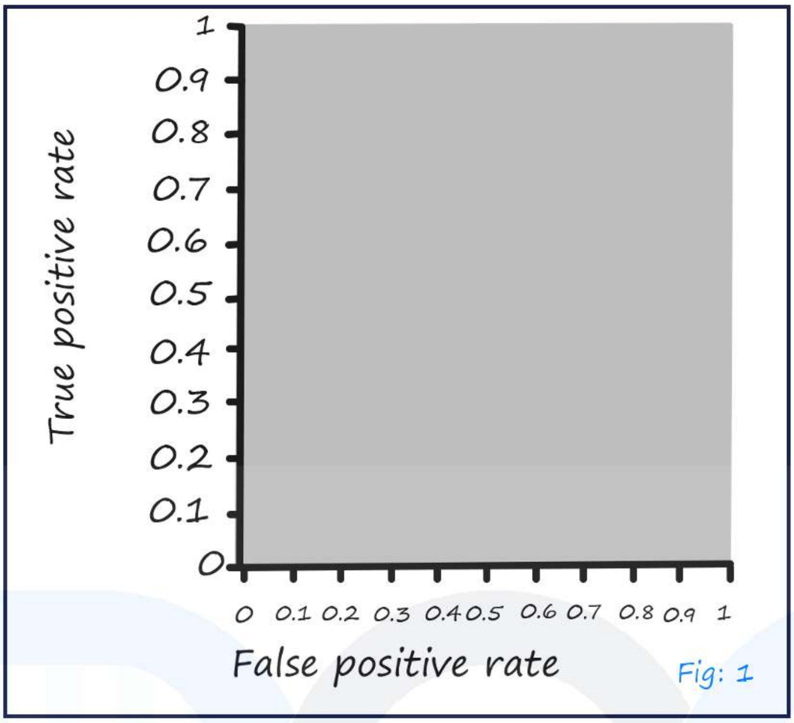

True positive rate
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
False positive rate

Fig: 1

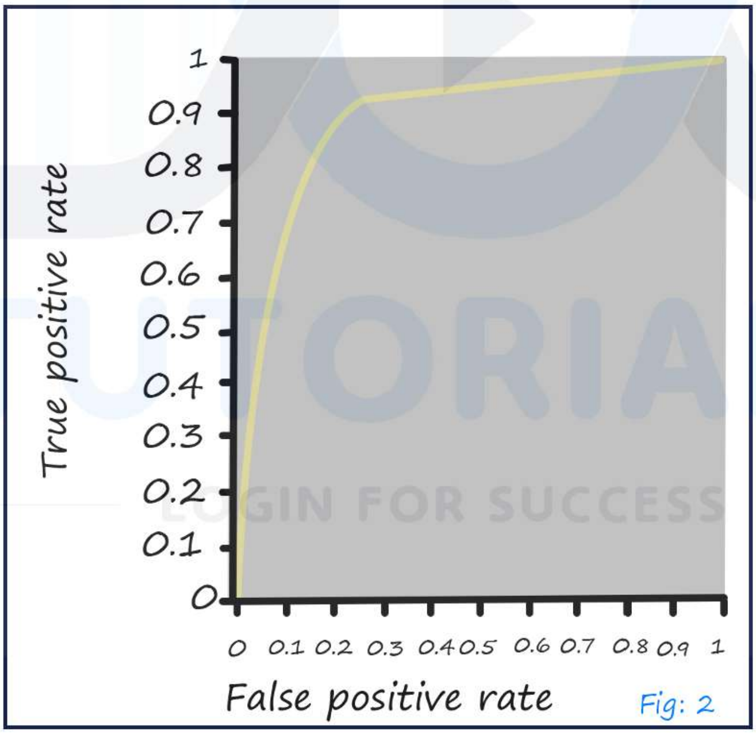

True positive rate
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
False positive rate

Fig: 2

Uses of ROC curve 00:00:22

- To determine a clinical cut-off, point for a screening test
- To compare different diagnostic tests for a particular condition
    - E.g.,- FBS (DM &Non-DM)
    - Fixed range of cut off (80-140mg%)
    - Find out TP, FP when each point taken as cutoff
    - Plot all values in the graph and get an ROC curve
    - Ideal cut off is maximum TP and minimum FP i.e., left upper most quadrant would be best cutoff point.eg FBS cutoff point= 126mg%

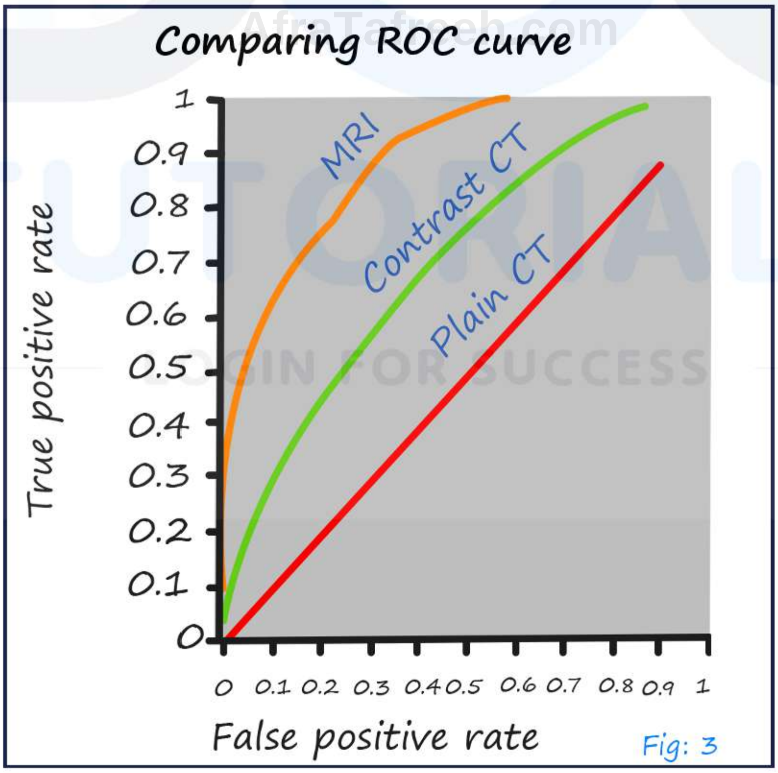


Fig: 3

- Above example shows MRI test is the best test as it is present in the left upper quadrant as compared to plain CT and contrast CT

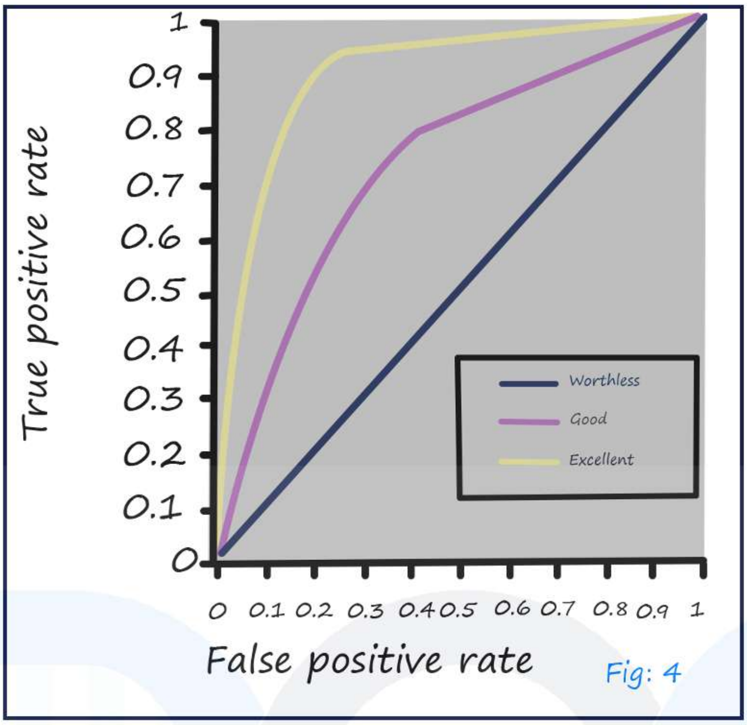


Fig: 4

- ROC Curve order in terms of best to worst are
- Curve A (yellow) > Curve B (purple) > Curve C (Blue)

DOC TUTORIALS
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CORRELATION

Introduction 00:00:26

- Shows the relationship between two quantitative variable
- Example:
  - Food
    1. Exposure (Amount of food you eat)
    2. Outcome (increase Body weight)
- Exposure is independent variable
- Outcome is dependent variable
- Correlation is measured using parameter known as **CORRELATION COEFFICIENT**
- Represented by – 'γ'
  - γ = -1 to +1 (minimum 0 and maximum value can be 1)
  - Sign = + (positive) increase exposure, increase outcome
  - Sign = - (negative) increase exposure, decrease outcome

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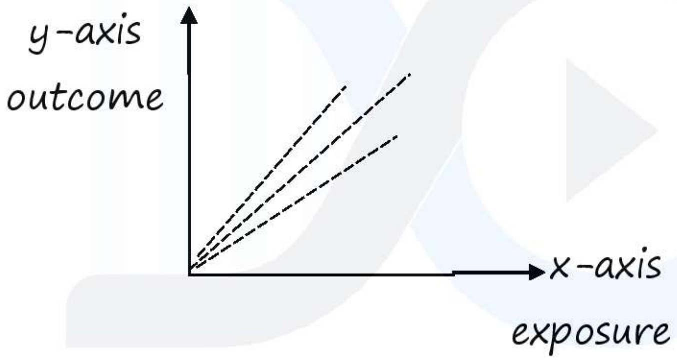
Number 00:04:40

- Number shows magnitude of association
- >0.7 → strong correlation
  - 1 → perfect correlation
  - 0 → no correlation

  - < 0.4 → weak correlation (0.3,0.2,0.1)
  - 0.7 to 0.4 → moderate correlation

Scatter diagram 00:07:18


y-axis
outcome
x-axis
exposure

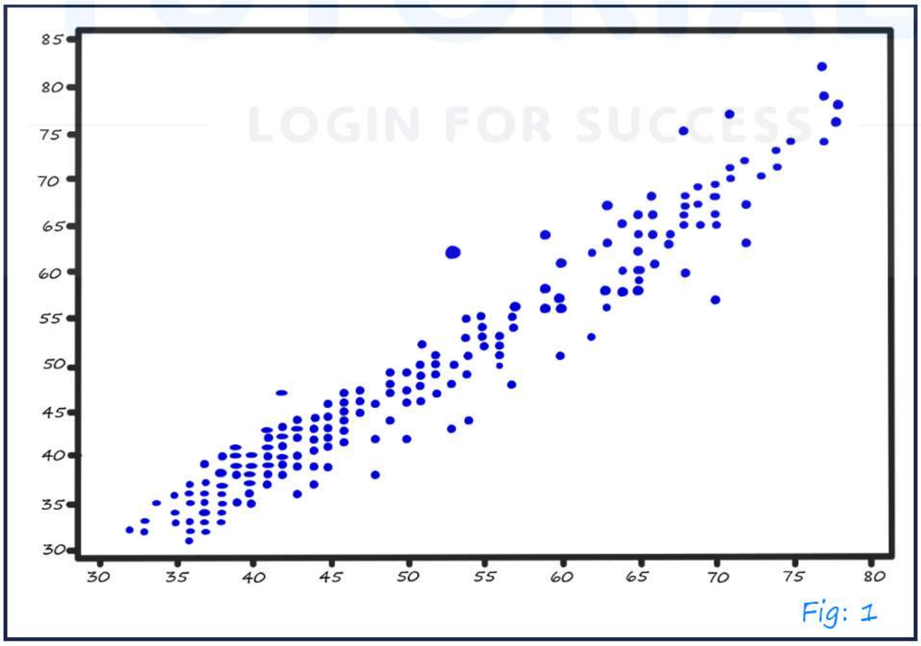


Fig: 1

- Scatter diagram (or) correlational diagram – positive correlation

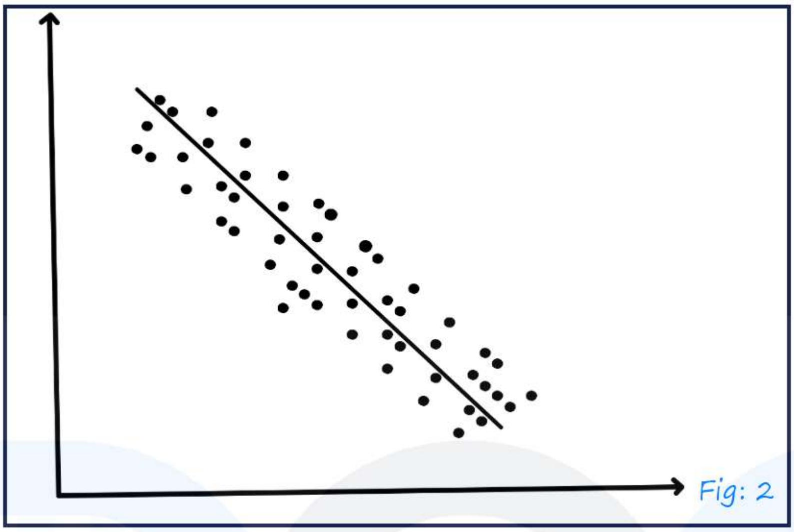


Fig: 2

- Above diagram is representation of '**Negative correlation' e.g- number of hours of watching movie and pg entrance marks**

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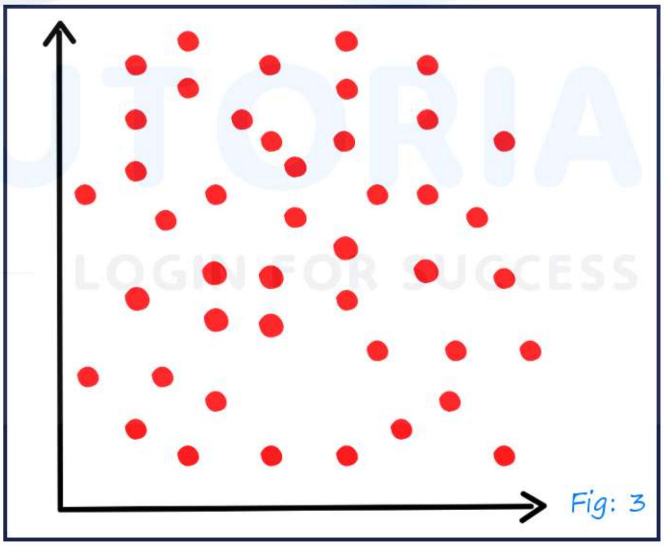


Fig: 3

- This graph shows 'No correlation' as the dots on graph are all scattered

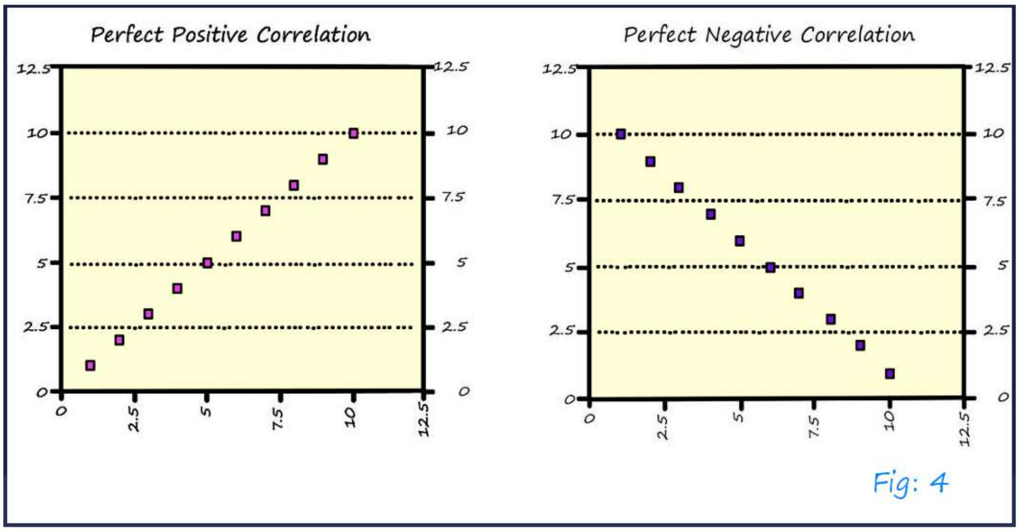


Fig: 4

- Example of perfect positive & perfect negative correlation

Correlation coefficient 00:07:18

i. Pearson's correlation coefficient (γ) → used in normal distribution & is a parametric test

ii. Spearman's correlation coefficient (Rho – 'P')

- Used in skewed distribution & non parametric method

TUTORIALS LOGIN FOR SUCCESS

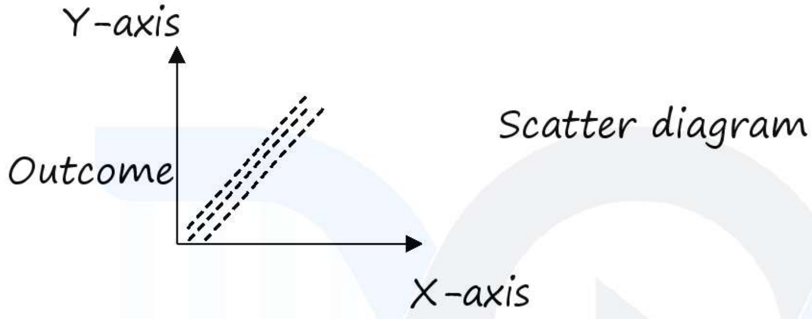
Multiple correlation coefficient 00:07:18

- More than 1 exposure on one particular outcome variable & find out net effect of all exposure
- Eg I want to know the PG entrance marks/scores if I study 8 hour, sleep 8 hour and watch 1 movie a day

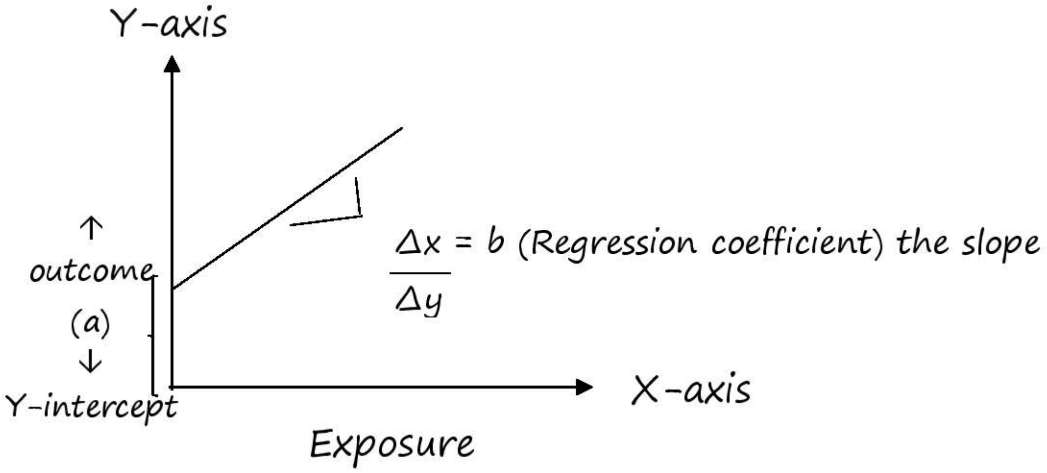
REGRESSION

Introduction 00:00:40

- Relationship between two quantitative variables
- Added advantage of Regression over correlation- if value of exposure if known, value of out come variable can be calculated


Y-axis
Outcome
Scatter diagram
X-axis

- After plotting a scatter diagram, a straight line is draw that passes through maximum number of dots
- Regression formula = Formula of straight line =
  - $Y = a + b x$
  - a → Y intercept
  - b → Regression coefficient
  - X → Exposure value
  - Y → Outcome value (To be calculated)


Y-axis
↑ outcome (a) ↓ Y-intercept
$\frac{\Delta x}{\Delta y}$ = b (Regression coefficient) the slope
X-axis
Exposure

- Eg x-axis -coconut intake, y axis- LDL cholesterol
- As coconut intake increases or decreases, the LDL will increase or decrease.
- Base line LDL is Y intercept i.e., constant or pre fixed
- Rate of increase of LDL with each coconut intake is the slope i.e., Regression co-efficient
- If a is 100 gm/dl, slope is ½, coconut intake is 300gm
- Thus Y = 100+1/2X300=250gm/dl

Applications: 00:14:30

- Medical advises by using regression technique
- Predicting fetal wt of baby by biparietal diameter & fetal weight, Femur length etc
- Non-medical field: Auto rikshaw meter- for initial 1.5 km there is base price "a", then price increases as per each unit increase

Multiple regression 00:18:00

- More than >1 exposure on one single outcome
- Formula -
- Y = a+b (x1) + c (X2) + d (X3)
- Y is Net LDL, a is Base line LDL, X1-coconut, X2-Burger, X3-Cocacola, b -is rate of rise of LDL as per unit coconut intake, likewise c, d etc

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Curvilinear 00:20:18

- When exposure has a power, e.g., Bacterial proliferation–there is a logarithmic rise in value (exponentially)
- Example $Y = a + b\,(x)^n$
- n could be 2,3,4 or 5 etc

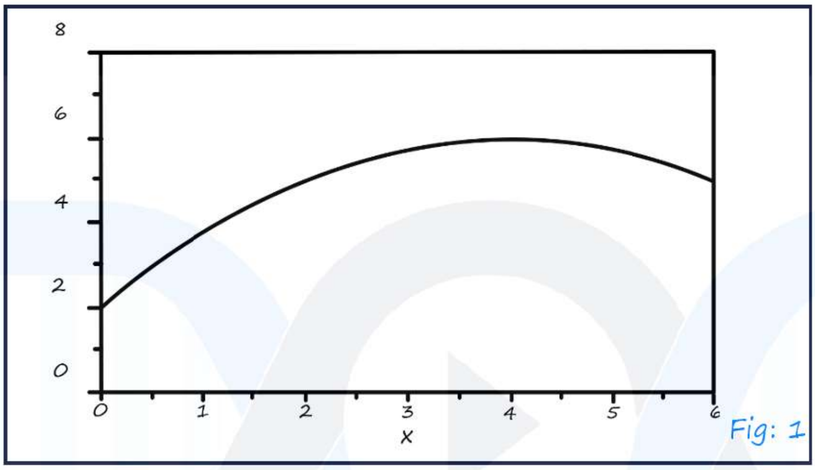

Fig: 1

Types of regression 00:22:10

- Logistic regression – Outcome variable is binomial – sigmoid or 's' shape
- Liner regression – Outcome is continuous

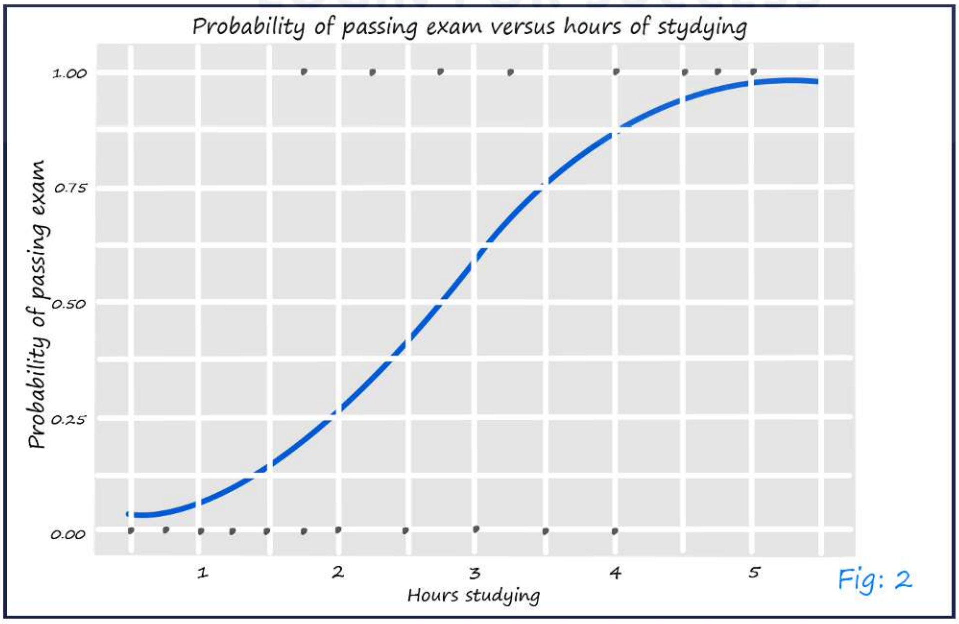

Fig: 2

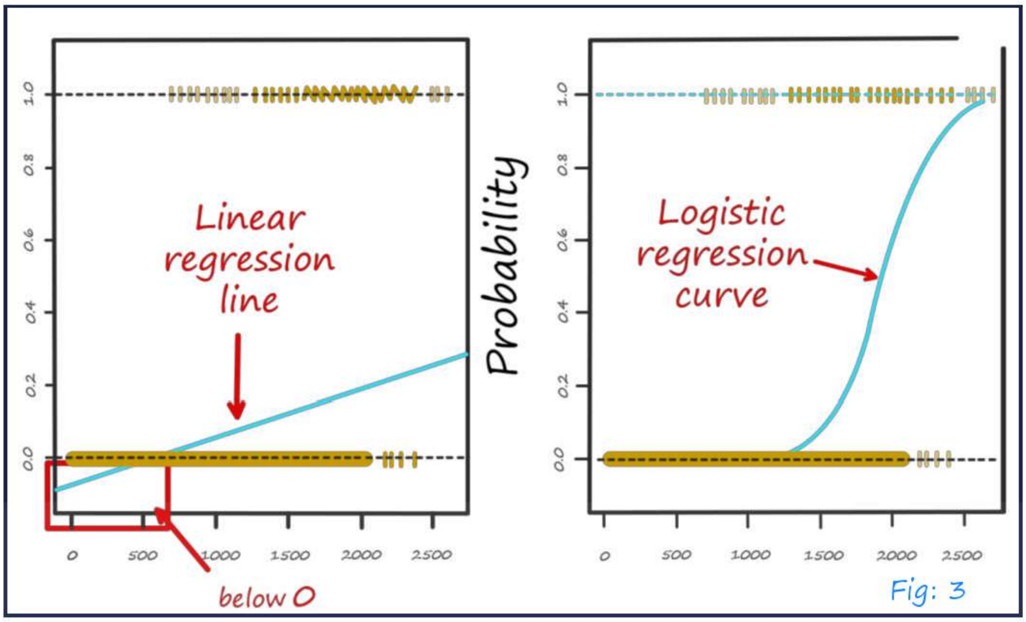

Fig: 3

Co efficient of De termination 00:24:46

- Percentage of variation in outcome variable → predicted by change in exposure variable
- r^2 = (Correlation co-efficient)^2
  - g Correlation coefficient is 0.5, then coefficient of Determination will be =0.25 i.e., 25%
  - It means That 25% change in LDL cholesterol (Outcome) is contributed or determined by change in coconut intake, rest of 75% is by other exposure variable that we don't know.

BIOMEDICAL WASTE

- First guideline for biomedical waste in India was made in 1998

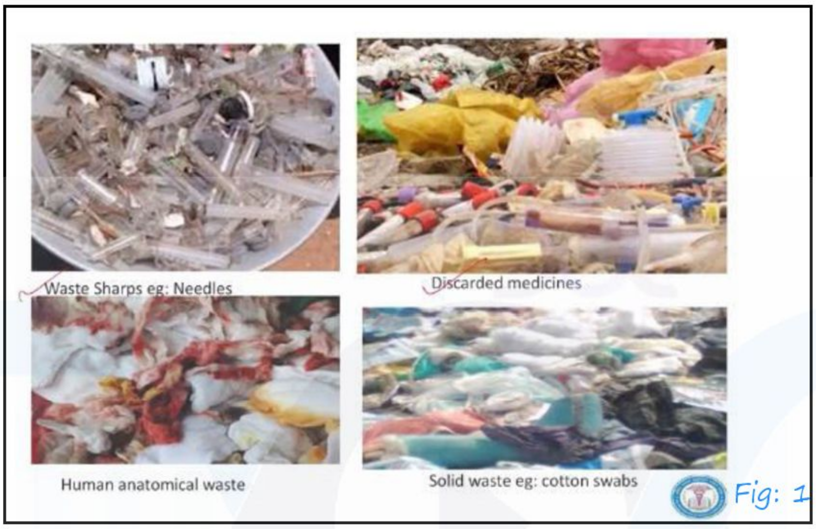
Waste Sharps eg: Needles
Discarded medicines
Human anatomical waste
Solid waste eg: cotton swabs

Fig: 1

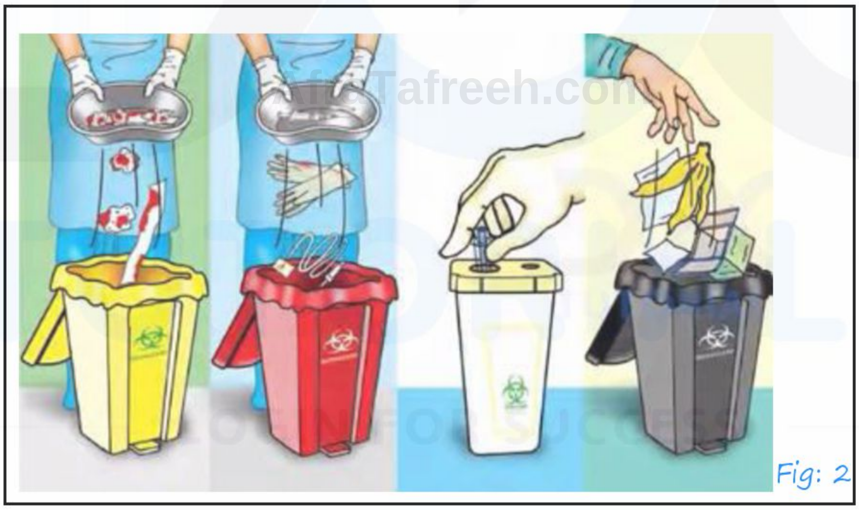

Fig: 2

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BIOHAZARD
BIOHAZARD

Fig: 3

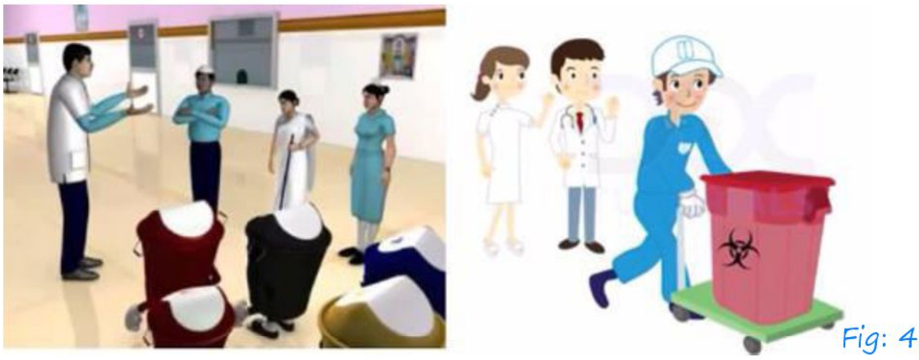
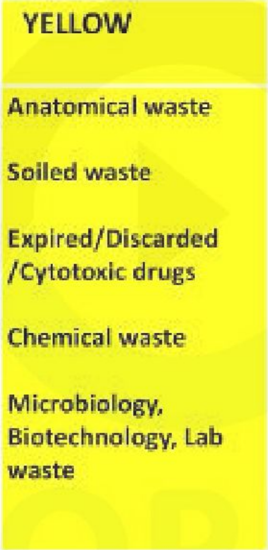


Fig: 4

- 4 colored categories
- 2016 guidelines



YELLOW

Anatomical waste

Soiled waste

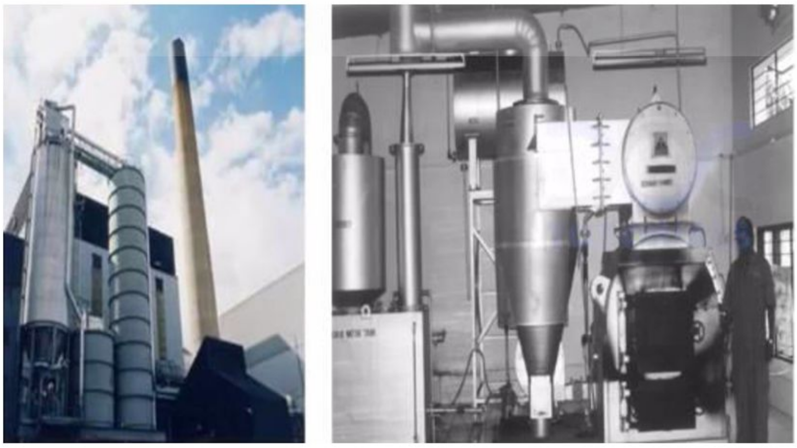
Expired/Discarded /Cytotoxic drugs

Chemical waste

Microbiology, Biotechnology, Lab waste

Fig: 5

- Yellow bag → goes to incinerator



↓

Incinerator ash pit

Fig: 6

BIODIAL INCINERATORS
LIMITED
ASH DISPOSAL PIT

Fig: 7

- White – sharp wastes

Disinfected and put inside sharp pit

Fig: 8

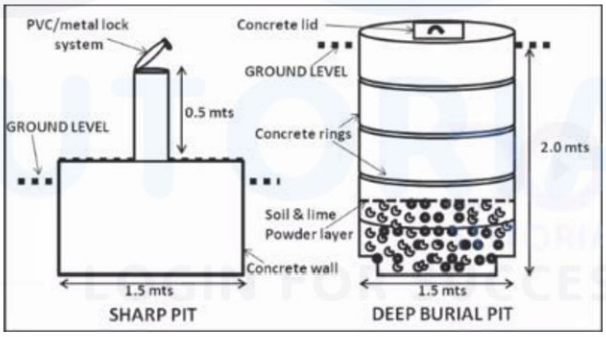
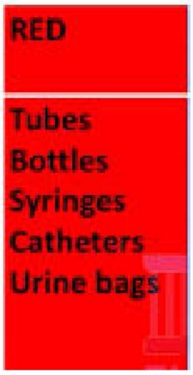

PVC/metal lock system
GROUND LEVEL
0.5 mts
1.5 mts
SHARP PIT
Concrete lid
GROUND LEVEL
Concrete rings
2.0 mts
Soil & lime Powder layer
Concrete wall
1.5 mts
DEEP BURIAL PIT

Fig: 9

- Red

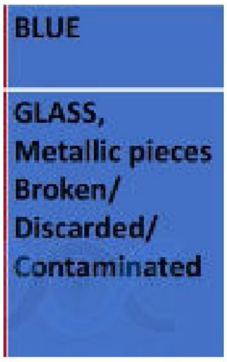


RED

Tubes
Bottles
Syringes
Catheters
Urine bags

Fig: 10

- Blue



BLUE
GLASS, Metallic pieces Broken/ Discarded/ Contaminated

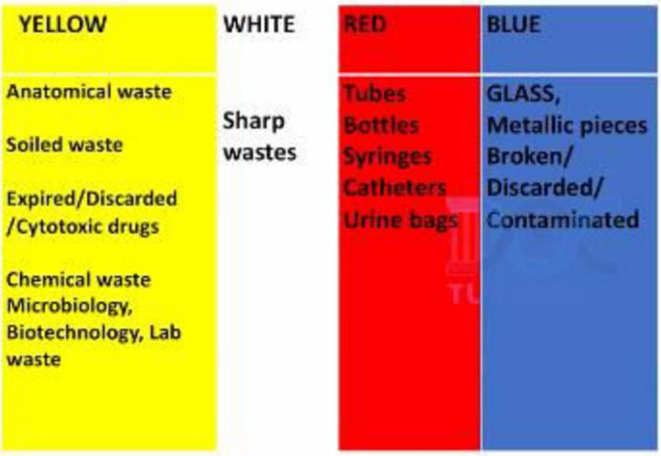
Fig: 11

- Q cardiac pacemaker → blue bag
- Q Blood bags → yellow bag
- Q Viral transport medium

↓

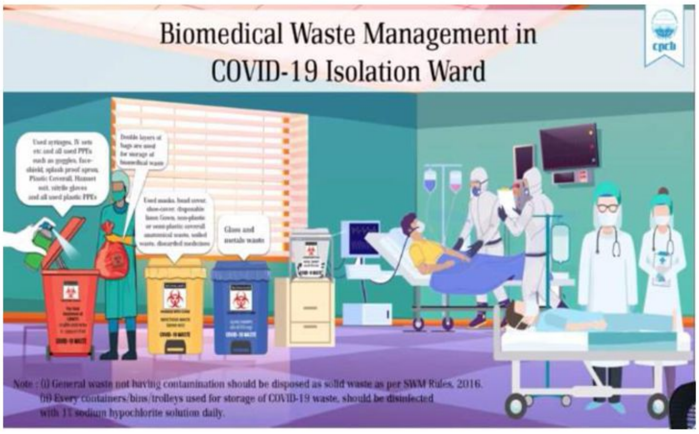
Red bag

Fig: 12



YELLOW	WHITE	RED	BLUE
Anatomical waste Soiled waste Expired/Discarded /Cytotoxic drugs Chemical waste Microbiology, Biotechnology, Lab waste	Sharp wastes	Tubes Bottles Syringes Catheters Urine bags	GLASS, Metallic pieces Broken/ Discarded/ Contaminated

Fig: 13



Biomedical Waste Management in COVID-19 Isolation Ward

cpcb
Used syringes, IV sets etc and all used PPEs such as goggles, face-shield, splash proof apron, Plastic Coverall, Hazmat suit, nitrile gloves and all used plastic PPEs
Double layers of bags are used for storage of biomedical waste
Used masks, head cover, shoe-cover, disposable linen Gown, non-plastic or semi-plastic coverall, anatomical waste, soiled waste, discarded medicines
Glass and metals waste
COVID-19 WASTE

Note : (i) General waste not having contamination should be disposed as solid waste as per SWM Rules, 2016.
(ii) Every containers/bins/trolleys used for storage of COVID-19 waste, should be disinfected with 1% sodium hypochlorite solution daily.

Fig: 14

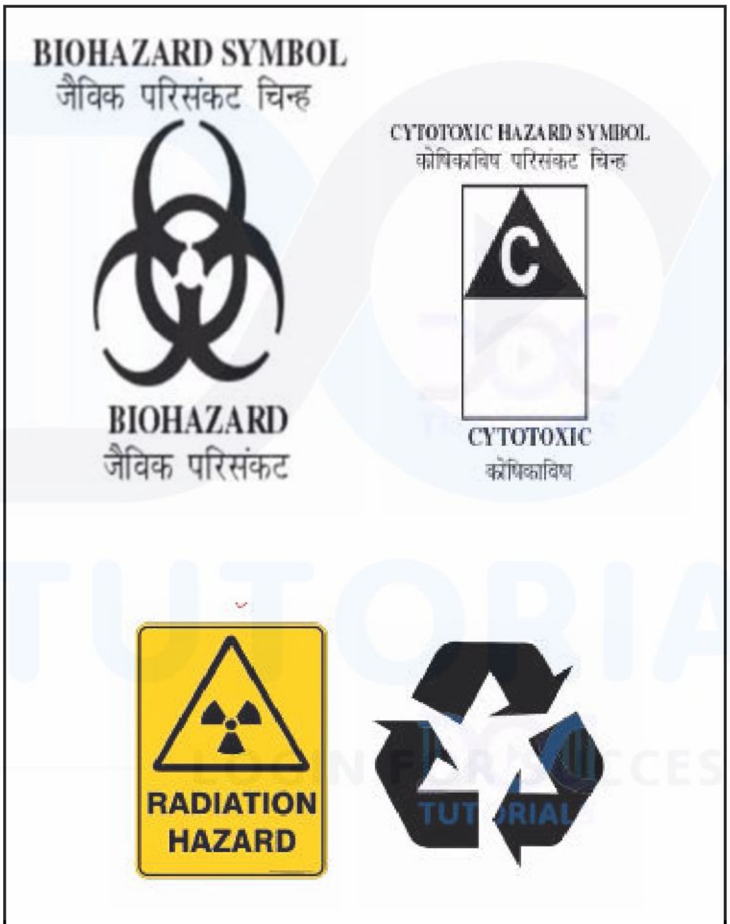
- Need to use double bags
- Disinfect with 1% hypochlorite solution

Isolation facility 00:12:14

- Red Bag: - Used PPEs such as goggles, face shield, splash proof apron, plastic coverall, Hazmat suit, Nitrile gloves

- Yellow bag → Used mask (Triple layer mask, N95 mask etc.), Head cover/cap, Shoe-cover, Tissues and toiletries, Disposable linen Gown, Non-plastic or Semi-plastic coverall
- Precaution
  - Double layered bags (using 2 bags) should be used for collection of waste from COVID-19 isolation wards
  - Should be labelled as "COVID-19 Waste"
- Laboratories for COVID-19 suspected patients
  - Pre-treat viral transport media, plastic vials, vacutainers, Eppendorf tubes, plastic cry vials, pipette tips → Red bag

- Home care / quarantine facilities
  - Yellow bag: Used masks, gloves and tissues or swabs contaminated with blood / body fluids of COVID-19 patients, including used syringes, medicines etc.
  - Masks and gloves used by persons other than COVID-19 patients should be kept in paper bag for a minimum of 72 hours


BIOHAZARD SYMBOL
जैविक परिसंकट चिन्ह
BIOHAZARD
जैविक परिसंकट
CYTOTOXIC HAZARD SYMBOL
कोषिकाविष परिसंकट चिन्ह
C
CYTOTOXIC
कोषिकाविष
RADIATION HAZARD

Recycling Fig: 15

Q. BMW rules were first made in India in the year

a. 1984

b. 1991

c. 1998 ✓

d. 2000

Q. what is the Colour coding of bag in hospitals to dispose off human anatomical wastes such as body parts

a. Yellow ✓
b. Black
c. Red
d. Blue

Q. safe disposal of mercury is

a. Collect carefully and recycle ✓
b. Controlled combustion
c. Treatment with chemicals
d. Deep burial

Q. All are incinerated except

a. Human anatomical waste
b. Animal waste
c. Infected solid waste
d. Broken thermometers ✓

Q. According to biochemical waste, which of the following bag can be incinerated

a. Red
b. Blue
c. Green
d. Yellow ✓

Q. Best way to dispose e-waste is

a. Burning
b. Incineration
c. In a landfill
d. Recycling ✓

Q. Cytotoxic drug disposal in India is by

a. Deep burial (landfill)
b. Dumping
c. Autoclave
d. Incineration ✓

Q. Urine bags and catheters disposal in India is by

a. Yellow bags
b. Red bags ✓
c. White containers
d. Blue bags

Q. Blood transfusion empty bag which color code for discarding

a. Yellow ✓
b. Red
c. Blue
d. White

TYPES OF DISASTERS

- Dis- bad effect- aster -stars: negative effects of stars as per earlier thoughts

Disaster as per WHO is something with following Components:

i. Causes damages

ii. Ecological disruption

iii. Loss of life

iv. Deterioration of health services

v. Need help from outside the affected area

vi. ≥30 people are hospitalized

World disaster reduction day 00:02:44

- **13th October**

TUTORIALS LOGIN FOR SUCCESS

Classification of disasters 00:03:27

- I/- Natural – Avalanche, sink hole, blizzards
- II/- Man-made –

  i. Bhopal gas tragedy

  - Happened in union carbide pesticide plant
  - 3rd December, 1984
  - Gas: - Methyl isocyanate
  - Killed >20,000 people

    6,00,000 people were injured

Warren Anderson- CEO of Union carbide pesticide plant

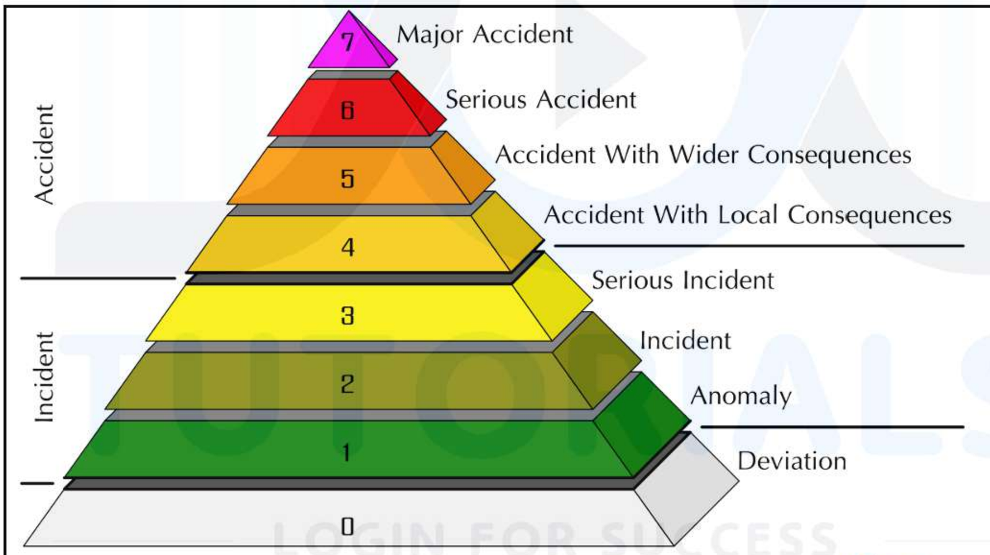
- ***World's worst man-made disaster***

ii. Chernobyl Nuclear Disaster- 26th April 1986

- First radioactive leak that went up to ***level 7*** on the international nuclear event scale for nuclear accidents

iii. Fukushima Daiichi Nuclear disaster

- Second nuclear power leakage that went ***up to level 7***


7
6
5
4
3
2
1
0
Major Accident
Serious Accident
Accident With Wider Consequences
Accident With Local Consequences
Serious Incident
Incident
Anomaly
Deviation
Accident
Incident

International Nuclear Event Scale Fig: 1

Disasters in India 00:10:41

- Chennai floods
- Uttarakhand floods
- Most common disasters in India is due to **hydrological disaster**.

MANAGEMENT OF DISASTERS

Disaster Management Cycle 00:00:56

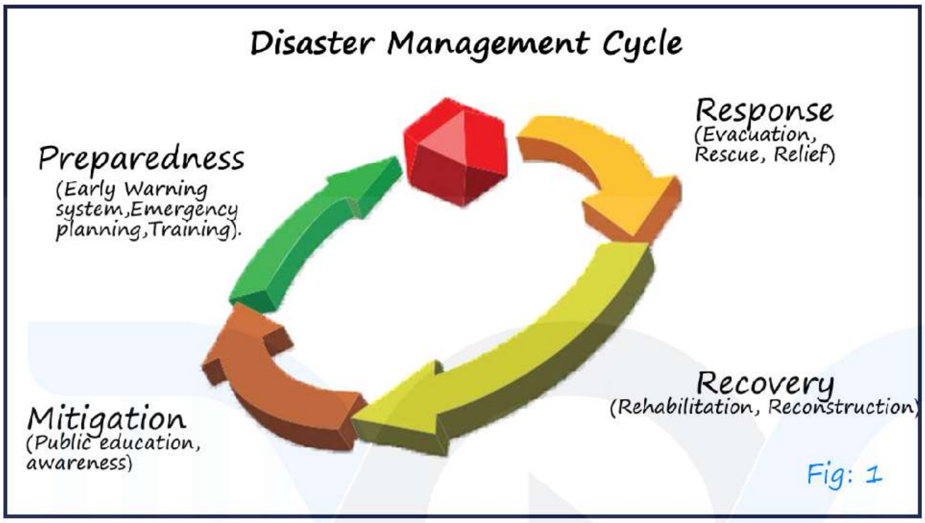

Disaster Management Cycle
Response
(Evacuation, Rescue, Relief)
Recovery
(Rehabilitation, Reconstruction)
Mitigation
(Public education, awareness)
Preparedness
(Early Warning system,Emergency planning,Training).

Fig: 1

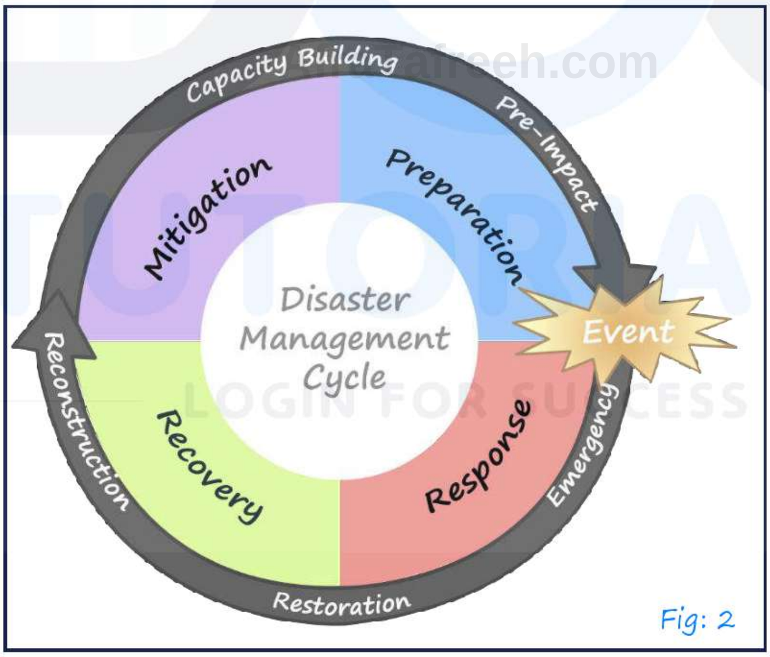

Capacity Building
Pre-Impact
Event
Emergency
Restoration
Reconstruction
Mitigation
Preparation
Response
Recovery
Disaster Management Cycle

Fig: 2

afreeh.com
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i. Stage – I

- Response stage
- Emergency response – Involves triage

ii. Stage – II

- Recovery stage
- Involves reconstruction of infrastructure

iii. Stage – III

- Mitigation phase
- Involves capacity building

iv. Stage – IV

- Preparation phase
- Pre – impact management

National Institute of Disaster Management 00:02:36

- National Institute of Disaster Management (New Delhi)
- Ministry of Home affairs
- Headed by Union Home Minister
- Objective –Training in disaster Management
- NDMA: National Disaster Management Authority (Apex body for Disaster Management)
- Headed By Prime Minister.

TUTORIALS LOGIN FOR SUCCESS

Triage 00:03:33

DECEASED
MINOR
DELAYED
IMMEDIATE

Fig: 3

a. Severity of injury

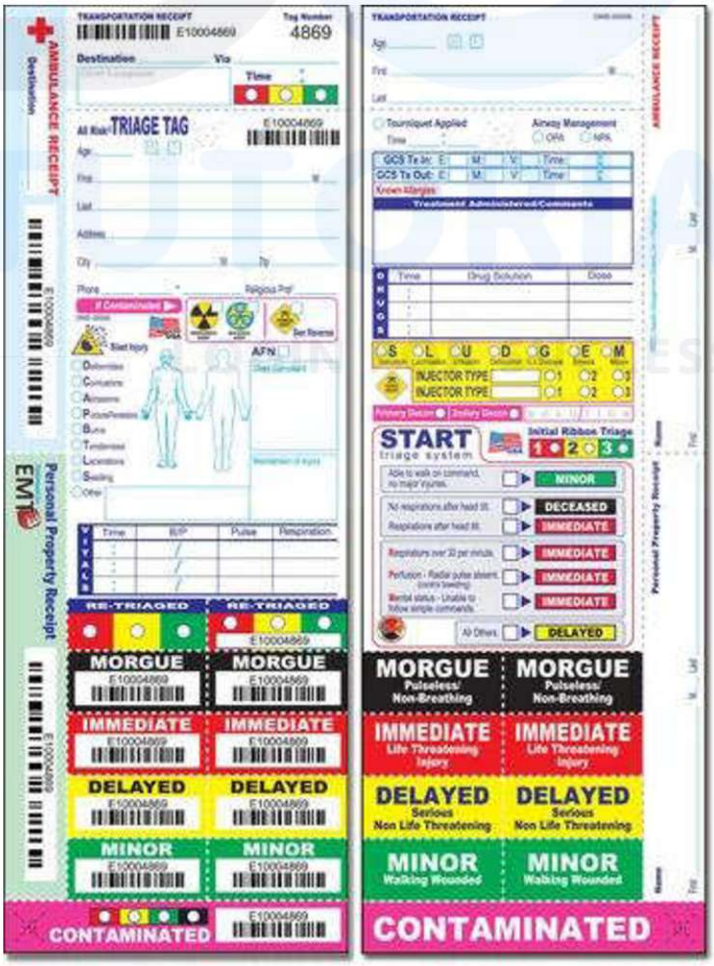
b. Likelihood of their survival

All the affected victims are categorized into 4 parts

Red	Yellow	Green	Black
↓	↓	↓	↓
High priority group	Medium priority	Low priority	Least priority
↓	↓	↓	↓
Within <6hrs	**Can wait up to 24hrs**	**Minor injuries**	**Dead/Near dead patients**

- Blue – for contaminated Pt. (Radioactive exposure patients)
- Steps of triage:
- Triage Sieve-It separates less injured to severely injured

- Triage sort- divide Victims in to various categories (4 categories as mentioned above)
- Tagging – Identification, age, place of origin, triage category, diagnosis and initial treatment are tagged on through a colour coding.
- To be done before transporting the patient.


TRANSPORTATION RECEIPT
Tag Number
4869
AMBULANCE RECEIPT
TRIAGE TAG
EMT
Personal Property Receipt
START
triage system
Initial Ribbon Triage
MINOR
DECEASED
IMMEDIATE
DELAYED
RE-TRIAGED
MORGUE
Pulseless/
Non-Breathing
IMMEDIATE
Life Threatening
Injury
DELAYED
Serious
Non Life Threatening
MINOR
Walking Wounded
CONTAMINATED

Types of Triages:

1. Simple triage- Usual one
2. Rapid triage – after simple triage the expert trained personnel can give a rapid first aid. Also known as- START: Simple Triage and Rapid Treatment
3. Reverse Triage: reverse of normal triage.
   Eg: less priority group attended first compared to high priority group. (When high profile cases like minister or vIPs or precious resources are involved we do reverse triage)
   In war -medical personnel considered as precious resources in War, we want them to be alive to treat more injured patients.

Hospital Emergency Codes 00:12:30

- Code- secret messages at time of emergency in form of codes.
  1.Orange- Mass Casualty/ Disasters
  2.Blue- Cardiac Arrest
  3.Red- Fire
  4.Green- Evacuation
  5.Yellow- Missing Patients
  6.White- Violent patient
  7.Pink- Pediatrics Emergency
  8.Black- Suspicious objects (Bomb)
  9.Silver-Active shooter (Gun)

Diseases Post Disaster 00:16:07

- MC disease in post disaster phase- Gastro-enteritis
- MC step in prevention- Chlorination of water bodies
- MC vaccine preventable disease- Measles
- Other Common diseases in post disaster:
- Gastro-enteritis
- Respiratory
- Leptospirosis
- Rickettsiosis
- Rabies
- Equine Encephalitis

vaccination 00:17:30

- No mass Vaccination
- Those Health workers involved should take Hep-B, TT vaccine

OCCUPATIONAL CANCERS AND CAISSON'S DISEASE

Common Occupational Cancers 00:00:15

i. Skin cancers

- Most commonly seen occupational cancer (75%)
- Most common occupational skin cancer → **Squamous cell carcinoma**

ii. Bladder carcinoma

- Most common symptom – painless hematuria
- Most common type of occupational bladder cancer is **Urothelial carcinoma of transitional cells**
- Most common risk factor – Tobacco use
- Carcinogen involved- Aromatic amines, B naphthylamine etc.
- Immunotherapy used in superficial bladder carcinoma

↓

Intravesical BCG vaccine

Weekly for 6 weeks treatment

iii. Lung cancer

iv. Leukemia

DOC TUTORIALS LOGIN FOR SUCCESS

Caisson's disease 00:05:40

- Decompression Sickness /Divers disease
- Inside deep sea under high pressure, nitrogen get dissolved in the body tissues.
- When the diver comes out to surface it goes to low pressure from high pressure.
- As per Boyles' law: Pressure inversely proportional to volume.
- Thus, the volume of gas start increasing, and they form bubbles and released out of tissues, start migrating to different tissues, causing pressure symptoms like compression of nerves, blockage of arteries.

Clinical features:

- DCS-1: Mild symptoms
- DCS-2: Moderate to severe symptoms
- Baro sinusitis- bubble affecting sinuses
- Baro otitis- middle ear
- Baro Dentalgia- tooth
- Emphysema- lung
- Abdominal Distention
- Bends- Joints affected
- Prickles- gas irritating nerve terminals of skin

TUTORIALS LOGIN FOR SUCCESS

Gass Implicated in DCS & Treatment00:10:00

- Nitrogen and oxygen: Heliox
- Trimix- nitrogen, helium, oxygen
- Most problematic gas is – Nitrogen
- Treatment: 100% Oxygen therapy
- Recompression room/chamber- for severe DCS

GENETICS AND HEALTH

- Father of Genetics – **Gregor Mendel**

↓

Fig: 1

- "**Bricks & Mortar theory**" by Hippocrates
- Aristotle: If bricks & Mortar theory is true how handicap parents are getting normal child. There are many factors determining the characters.

Terms 00:03:23

i. Eugenics – (GOOD, GENES) Study of genes

2 Types

Positive eugenics
↓
Improving the genetic Components of genes
↓

Negative eugenics
↓
Increasing genetic endowments by decreasing negative genes
↓

Increases reproduction among genetically advantaged groups ↓	Decreases reproduction among disadvantaged groups ↓
i. In-vitro fertilization	i. Abortions
ii. Cloning	ii. Sterilization
iii. Egg transplants	iii. Family planning techniques

ii. Euthenics:

- Modifying environment to improve genetic endowments

iii. Euphenics: (Phenotype or appearance)

- Deals with genetic phenotype.
- Activities aiming to compensate genetic defects
- Eg: Galactosemia patient getting galactose free diet

iv. Dysgenics: opposite of eugenics

- Factors that produce defective genes in the progeny.
- Eg World war-1(All males having healthy/good genes are asked to go to war and they died, thus next generation of those who were left alive were defective)

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Hardy Weinberg Law 00:13:10

- LAW- Number of genes – constant/human population is static without as external force .

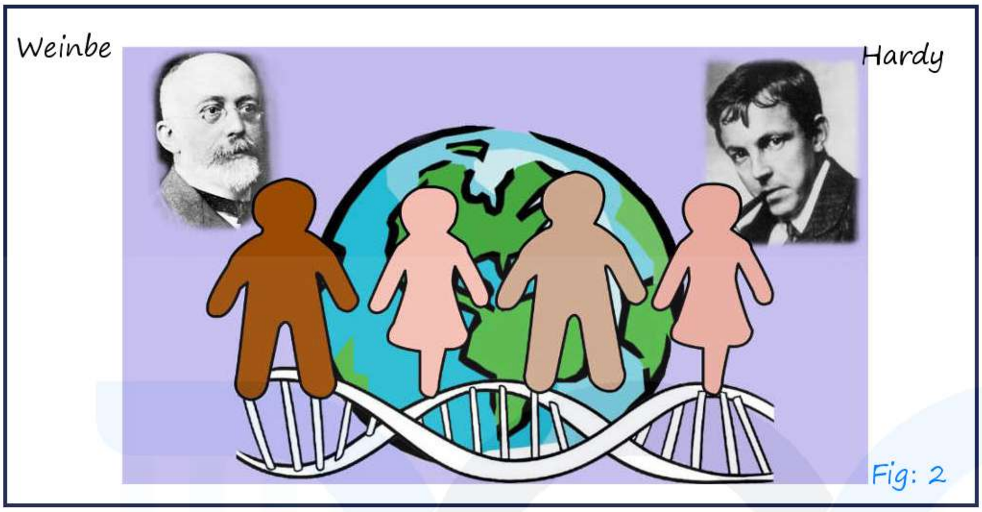

Fig: 2

If population is disturbed, i.e known as : deviations

Deviations 00:14:45

i. Non-random mating (assortative mating): Too much frequent mating in 2 sub-groups- can lead to bad genes to express, thus consanguineous marriage are not recommended

ii. Mutations

iii. Gene flow (Immigration and emigrations etc.)

iv. Natural selection (Healthy ones/genes got selected by nature)

v. Genetic drift (Lucky ones/ genes but not healthy genes got selected and stayed back)

TUTORIALS LOGIN FOR SUCCESS

Punnett Square 00:19:30

- Used to find the probability of an offspring having a particular genotype.
- Used in genetic counselling.

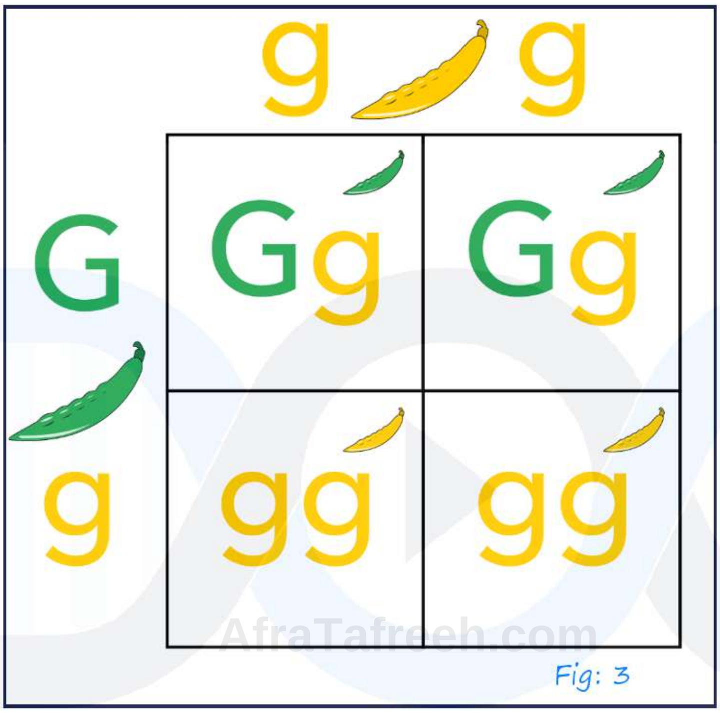

Fig: 3

DIAGNOSIS OF PULMONARY TB IN ADULTS

Tuberculosis (TB) 00:00:55

- NTEP – National Tuberculosis Elimination programs (previously known as RNTCP)
- The change in name is in line with the larger goal of eliminating the disease by 2025, five years ahead of the Sustainable Development Goals target.

Presumption TB criteria

- Cough > 2 weeks
- Fever > 2 weeks
- Significant weight loss
- Hemoptysis
- Any abnormalities in chest radiography
  - 2 sputum samples are collected
    - i. Spot sample
    - ii. Early morning spectrum sample because cough reflex is suppressed when sleeping so spectrum will have lots of TB bacilli collected overnight

Diagnosis of TB (NAAT)

- Usually, CB NAAT is done in RNTCP
- CB NAAT (Cartridge Based Nucleic Acid Amplification Test)
- NAAT is preferred over microscopy because –

- It requires only 100 TB bacilli/ ml to give positive result whereas, Microscopy needs 10,000 bacilli/mL
- Result is given within 2 hours
- It also tells us if a patient is Rifampicin resistant

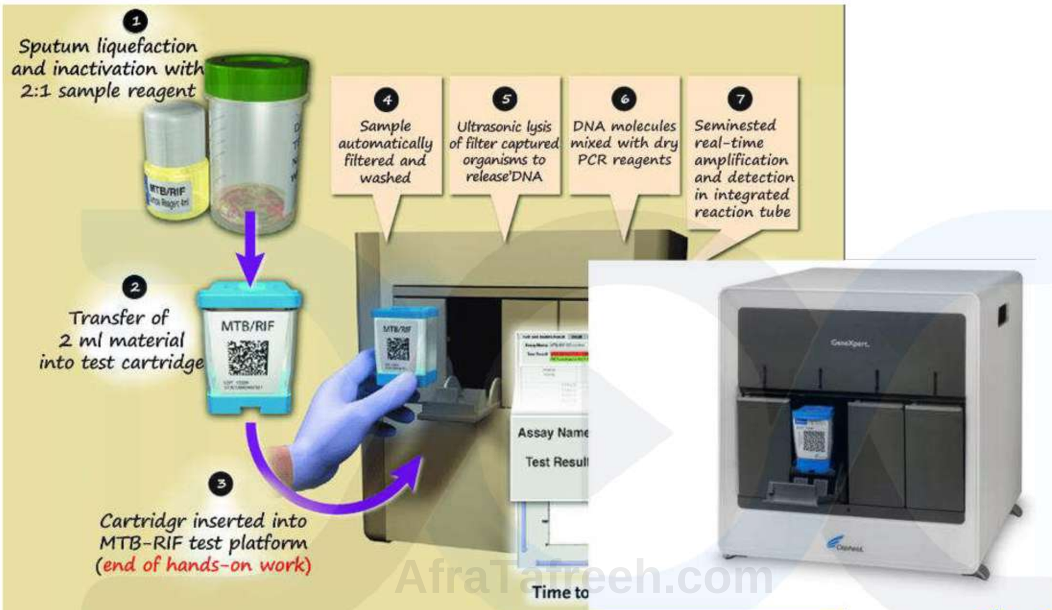
1
Sputum liquefaction and inactivation with 2:1 sample reagent
2
Transfer of 2 ml material into test cartridge
MTB/RIF
3
Cartridgr inserted into MTB-RIF test platform
(end of hands-on work)
4
Sample automatically filtered and washed
5
Ultrasonic lysis of filter captured organisms to release'DNA
6
DNA molecules mixed with dry PCR reagents
7
Seminested real-time amplification and detection in integrated reaction tube
Assay Name
Test Result
Time to
GeneXpert

Fig: 1

What is new in TB? 00:08:30

- Daily regimen
- Fixed drug combination
- **No treatment categories**
- New drugs
- No injections (Injection Streptomycin is 2nd line now)
- New technologies
- Drug susceptibility guided treatment
- **RNTCP program name changed in 2020**

TUTORIALS LEARN FOR SUCCESS AfraTafreeh.com

New terms in TB 00:11:10

- **Defaulter** →A person who was started on treatment and **left treatment for > 1 month**
  - 'Defaulter' name changed to '**lost to follow up**'
- **Failure** → A person whose **sputum positive at the end of recent treatment**
- **Relapse** → Person who was declared cured coming back with positive sputum results
  - The term 'Relapse' has been changed to '**Recurrent TB**'
- Drug sensitive TB → A person who is sensitive to INH and Rifampicin
- Mono Resistant TB →A person who is resistant to any 1st line ATT
- **Multi drug resistance** → A person who is resistant to both INH and Rifampicin
- **Poly drug resistant TB** → A person resistant to > 1, 1st line ATT but not to INH and Rifampin
- Extensively drug resistant (XDR) → A person resistant to INH, Rifampicin, 1 fluoroquinolone, 1 2nd line injectable
  - Mnemonic for 2nd line injectable is 'sack'

S → Streptomycin
A → Amikacin
C → Capreomycin
K → Kanamycin

'SACK'

TUTORIALS LOGIN FOR SUCCESS

- Extremely drug resistant (XXDR) → Also known as TDR (Totally Drug Resistant TB)
- **Mixed pattern drug resistance** → Anything that comes outside XDR definition.

Tests done in tb diagnosis 00:23:44

- CBNAAT → tells if patient is rifampicin resistant by detecting '**rpoB' gene**
- **The Xpert MTB/RIF assay or Cartridge Based Nucleic Acid Amplification Test (CBNAAT) is a semi-automated, molecular assay, which permits rapid TB diagnosis through detection of the DNA of Mycobacterium tuberculosis.**
- **FL-LPA** → first line 'Line Probe Assay' → tells about INH resistance by detecting
- either Kat-G mutation (INH cannot be given) or
- INH A mutation (high dose INH needs to be given)
- **SL-LPA** (Second line 'Line Probe Assay) →
  - To know if patient is **resistant to SLI and/ or Fluoroquinolones**
  - If patient is INH resistant due to Kat G mutation INH is deferred
  - If patients are INH resistant due to INH A mutation, he will respond to high doses of INH

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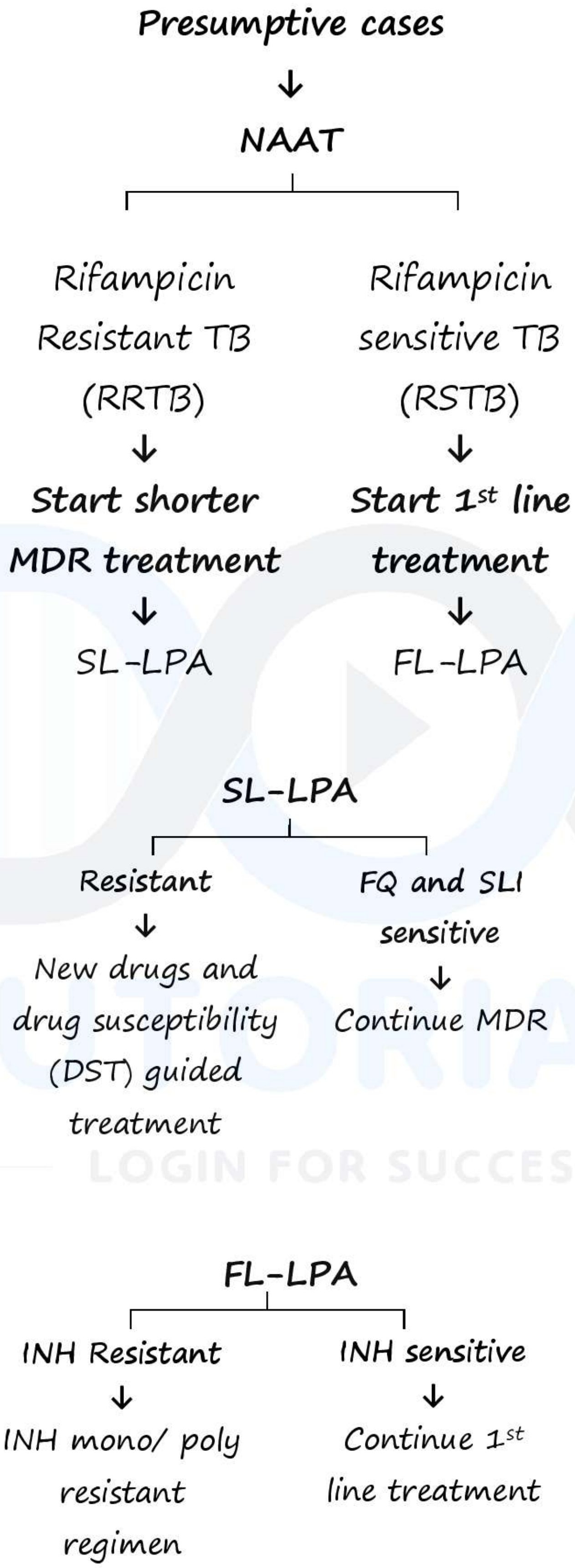
Latest algorithm in pulmonary tb management



Presumptive cases

↓

NAAT

Rifampicin Resistant TB (RRTB)

↓

Start shorter MDR treatment

↓

SL-LPA

Rifampicin sensitive TB (RSTB)

↓

Start 1st line treatment

↓

FL-LPA

SL-LPA

Resistant

↓

New drugs and drug susceptibility (DST) guided treatment

FQ and SLI sensitive

↓

Continue MDR

FL-LPA

INH Resistant

↓

INH mono/ poly resistant regimen

INH sensitive

↓

Continue 1st line treatment

- All INH Resistant cases are subjected to SL-LPA.

DOC TUTORIALS
LOGIN FOR SUCCESS

Universal Drug Susceptibility Testing (DST)

00:37:00

- **Drug susceptibility testing means testing to find out if a person has got drug resistant TB. That means finding out which drugs the TB bacteria in their body are sensitive to.**
- Rapid DST for at least rifampicin among all notified TB patients and further DST on rifampicin resistant for at least fluoroquinolone and SLI drugs
- CB NAAT – Genome Sequencing
- Cartridge based nucleic acid amplification test
  - The second generation NAAT – based TB diagnostics offer the prospect of very high sensitivity, approaching that of **liquid culture – the current gold standard for TB diagnosis**
  - In addition, some versions of NAAT also provide information on drug susceptibility to rifampicin, which is a surrogate marker in most countries for identification of patients who are most likely to have MDR-TB, thus allowing the early initiation of standardized 2nd line TB treatment

TREATMENT OF PULMONARY TB IN ADULTS

PART – I

- First-line anti-TB agents that form the core of treatment regimens are:
- Isoniazid (INH)
- Rifampin (RIF)
- Ethambutol (EMB)
- Pyrazinamide (PZA)

DOC TUTORIALS LEARN FOR SUCCESS

First line treatment (Daily regimen) 00:00:20

- Intensive phase (IP) → 2 months
  - Drugs given are INH, Rifampicin, Pyrazinamide, Ethambutol (HRZE)
- Continuation of phase (CP) → 4 months.
  - Drugs given are INH, Rifampicin, ethambutol (HRE)

Tablets based on weight bands

- Weight bands are

  i. 25-34 kg

  ii. 35-49 kg

  iii. 50-64 kg

  iv. 65-75 kg

  v. >75kg
- Number of tablets in (FDC) Fixed Drug Combinations:

Weight category	IP(HRZE)	CP(HRE)
25-34 kg	2	2
35-49 kg	3	3
50-64 kg	4	4
65-75 kg	5	5
>75 kg	6	6

Number of doses Fixed: 00:04:40

- 1 month →28 days
- 1 dose → 1 day (regardless of no of tablets)
  - Doses in IP is 56 doses (28×2)
  - Doses in CP is 112 doses (28×4)

Follow up:

i. Follow up sputum is taken at:
   a. End of IP
   b. Completion of treatment

ii. Clinical follow up every month

iii. Long-term follow up at the end of 6th, 12th, 18th and 24th month

TUTORIALS LOGIN FOR SUCCESS

H-mono/poly drug resistant TB regimen 00:07:50

a. Given for R Sensitive H resistant TB

b. INH is replaced by levofloxacin (Lfx) Lfx RZE → 6 months.

c. No IP and CP

d. Extended till 9 months in:

   i. In patients with extensive disease

   ii. Uncontrolled comorbidity

   iii. Extra pulmonary TB

   iv. Smear positive at the end of 3rd month (result by 4th month)

   v. In CNS, skeletal and miliary - TB → extended till 1 year

   vi. Smear positive at end of 5th month → declared as failure.

Shorter MDR TB regimen

a. Given for 9-11 months
   - IP (4-6 months)
   - CP (5 months)

b. 7 drugs are used

c. IP (4-6 months)

- Mnemonic → '**POKE MON CHIP**'
    - i. P → Pyrazinamide
    - ii. K → Kanamycin
    - iii. E → Ethambutol
    - iv. M → Moxifloxacin
    - v. C → Clofazimine
    - vi. H → high dose Isoniazid

   vii. P → Prothionamide (Ethionamide)

d. **CP (5months): POKE MON CHIP= with Knife cut the HIP: Thus we exclude-kanamycin, high dose isoniazid and Prothionamide**
   i. Pyrazinamide
   ii. Ethambutol
   iii. Moxifloxacin
   iv. Clofazimine

e. Follow up of shorter MDR
   - Sputum collected at end of 4th month, if smear positive, IP extended for maximum 2 months

New classification of anti TB drugs 00:17:10

Groups	Anti TB drugs
A	Levo /Moxi, Bedaquilline, Linezolid
B	Clofazimine/, Cycloserine or Terizidone
C	Ethambutol, Delamanid, Pyrazinamide, Imipenam – cilastatin, Amikacin, Streptomycin, Enthionamide/Prothionamide, PAS
Other medications	Kanamycin, Capreomycin, Amoxicillin – Clavulanic acid.

TUTORIALS LOGIN FOR SUCCESS

- Classification is based on safety of drugs. Safety decreases from A →C

Group	Drugs
A. Fluoroquinolones	Levofloxacin (Lfx) Moxifloxacin (Mfx) Gatifloxacin (Gfx)
B. Second-line injectable agents (SLI)	Amikacin (Am) Capreomycin (Cm) Kanamycin (Km) (Streptomycin) (S)
C. Other core second-line agents	Ethionamide / Prothionamide (Eto/Pto) Cycloserine / Terizidone (Cs/Trd) Linezolid (Lzd) Clofazimine (Cfx)
D. Add-on agents (not part of the core MDR-TB regimen)	D1 Pyrazinamide (Z) Ethambutol (E) High-dose isoniazid (H') D2 Bedaquiline (Bdq) Delamanid (Dlm) D3 p-aminosalicylic acid Imipenem (PAS) Cilastatin4 Meropenem4 (Ipm/Mpm) Amoxicillin-clavulanate4 (Amx-Clv) (Thioacetazone) (T)

DX TUTORIALS
LOGIN FOR SUCCESS

Longer MDR TB regimen 00:18:20

i. Bdq (6) Lfx, Lzd, Cfz, Cs (18-20) [B, 2 L, 2C]

Bdq → Bedaquilline

Lfx → Levofloxacin

Lzd → Linezolid

Cfz → Clofazimine

Cs → Cycloserine

ii. Bdq can be given only for 6 months but rest of the drugs are continued.

iii. Follow up of longer MDR regimen:

- Sputum is collected at end of 4th and 6th month.

	Intensive Phase	Continuation Phase
H mono-poly DR TB regimen	Lfx R Z E (6)	
Shorter MDR	Mfx/Am Eto Cfz Z H E (4-6)	Mfx Cfz Z E (5)
Longer MDR	Bdq (6) Lfx Lzd Cfz Cs (18-20)	

Bedaquilline (bdq)

a. Class – diarylquinoline

b. Mechanism of Action – ATP synthase inhibitor.

c. Criteria to start Bedaquilline:

i. Case of DR TB

ii. Patient should be > 18 years

iii. Non – pregnant women using non-hormonal methods of contraception

d. Contradictions:

i. Prolonged QT interval

ii. Cardiac arrhythmias

e. Schedule:

i. Week 0-2: daily 400mg (4 tables of 100mg each)

ii. Week 3-4: 600 mg weekly

↓

3 doses of 200 mg (minimum gap of 48 hours between two doses)

↓

[Minimum 48 hours gap b/w two doses.]

- The following group of patients are eligible for BDQ therapy:
  1. MDR/RR TB with resistance to any/all fluoroquinolones (FQ) or to any/all second-line injectable agents (SU) XDR-TB
  2. Mixed pattern resistant TB (XDR-TB + additional first line / second line resistant TB)
  3. Treatment failure of MOR- TB + FQ/SLJ resistance or XDR-TB

TUTORIALS LOGIN FOR SUCCESS

Delamanid (DLM)

a. Dihydro – nitro imidazole oxazole derivative

b. M.O.A → inhibition of mycolic acid production

c. 50mg for MDR TB

d. 100 mg for 24 weeks

e. Indication – MDR TB/XDR in adults and adolescents (6-17 years) including PLHIV

f. **Special caution in HIV, DM, hepatic, renal failure, 65+, substance abuse**

g. Bdq and Dlm have been **introduced into RNTCP after 40 years** since last drug Rifampicin was introduced

PaMZ Regimen 00:28:20

a. International regimen. (Nitroimidazole, a class of novel anti-bacterial agents.)

b. Pretomanid – PA-824 + Moxifloxacin + pyrazinamide.

EXTRA-PULMONARY AND PEDIATRIC TB

- Extrapulmonary tuberculosis (EPTB) is an infectious disease caused by Mycobacterium tuberculosis that occurs in organ systems other than the lungs

Presumptive extra pulmonary tb 00:00:27

- Criteria:
  - Swelling of lymph node
  - Pain in joints
  - Neck stiffness
  - Disorientation
  - Weight loss
  - Fever for > 2 weeks
  - Night sweats

Diagnosis of extra pulmonary tb 00:01:05

- Specimen/Tissue from the site is taken and **CBNAAT or liquid culture is done.**
- **Sputum is not taken.**

Treatment of extra pulmonary tb

i. Same as pulmonary Tb.

ii. Continuation phase may be extended by 3-6 months in certain cases like:
  - TB meningitis

- Spinal TB

iii. **Adjuvant corticosteroid treatment is given for TB meningitis and pericarditis.**

iv. In tuberculous meningitis → Ethambutol should be replaced with streptomycin.

- Tuberculosis in children usually represent between 6-8 per cent of all tuberculosis in the age group of under 15 years.
- The frequency of childhood TB in a given population depends on:
  i. the number of infectious cases
  ii. closeness of contact with an infectious case;
  iii. the age of child when exposed to TB; and the age structure of the population.

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Presumptive pediatric tb

- **Persistent fever > weeks**
- **Cough >2 weeks**
- **Loss of weight**
- **No weight gains**
- **History of contact with TB case**

Diagnosis of pediatric tb 00:03:30

---

i. **Sputum sample is taken and NAAT is done**

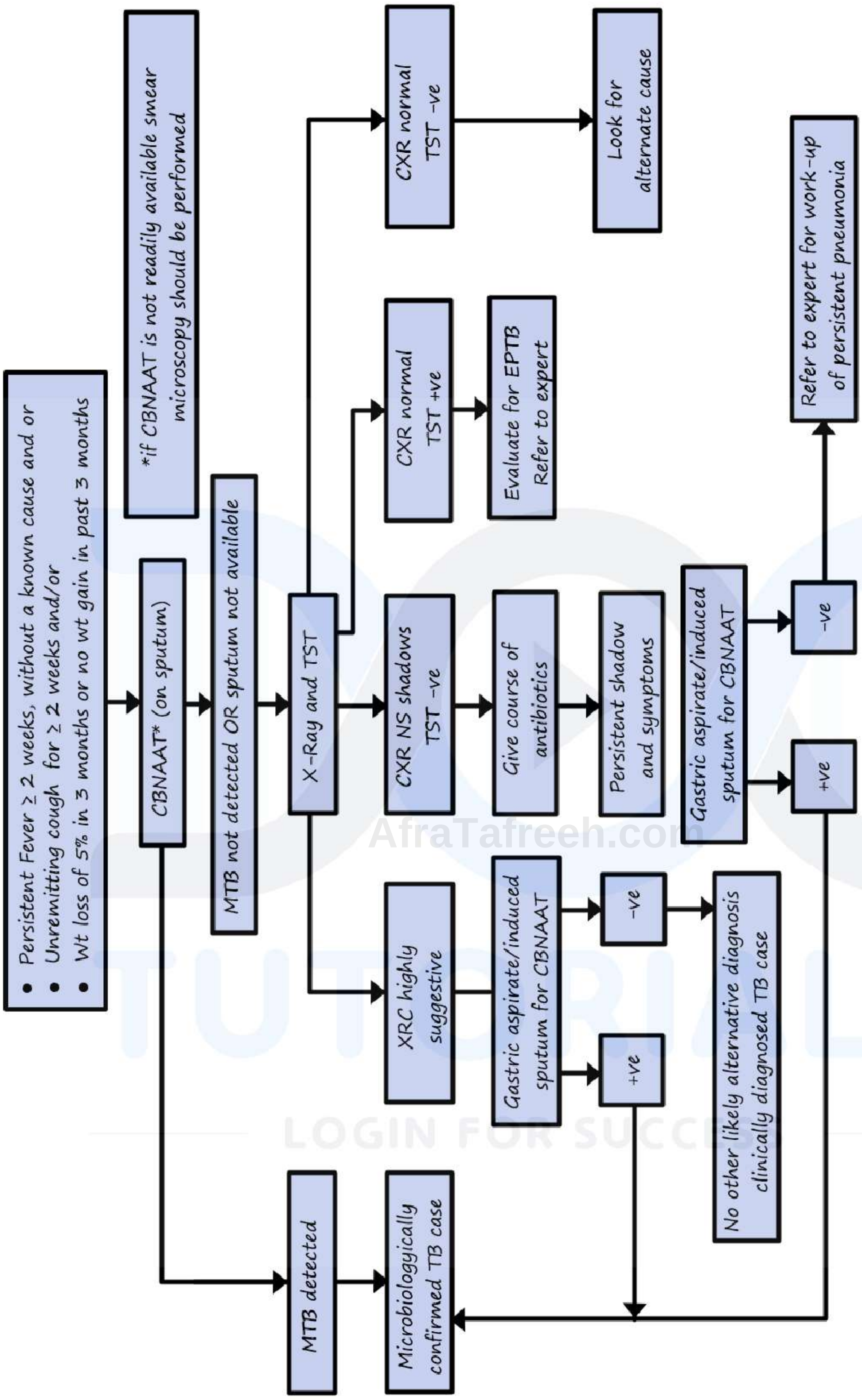
ii. If sputum is not available, **then chest X-ray and tuberculin skin test are done**

iii. If any of the above is suggestive of TB, then **gastric lavage/induced sputum is taken and NAAT is done.**

Treatment of pediatric tb

- Weight band for children (6 weight bands)
  - i. 4 – 7 kg
  - ii. 8 – 11 kg
  - iii. 12 – 15 kg
  - iv. 16 – 24 kg
  - v. 25 – 29 kg
  - vi. 30 – 39 kg
- Drug dose

Weight category	Number of tablets (dispersible FDCS)			Inj. Streptomycin
	Intensive phase		**Continuation phase**	**Mg**
4-7 kg	1	1	1	100
8-11 kg	2	2	2	150
12-15 kg	3	3	3	200
16-24 kg	4	4	4	300
25-29 kg	3+1A	3	3+1A	400
30-39 kg	2+2A	2	2+2A	500
A = Adult FDC (HRZE = 75/150/400/275; HRE = 75/150/275				


Persistent Fever ≥ 2 weeks, without a known cause and or
Unremitting cough for ≥ 2 weeks and/or
Wt loss of 5% in 3 months or no wt gain in past 3 months
CBNAAT* (on sputum)
*if CBNAAT is not readily available smear microscopy should be performed
MTB not detected OR sputum not available
X-Ray and TST
XRC highly suggestive
CXR NS shadows TST -ve
CXR normal TST +ve
CXR normal TST -ve
Gastric aspirate/induced sputum for CBNAAT
Give course of antibiotics
Evaluate for EPTB Refer to expert
Look for alternate cause
-ve
+ve
Persistent shadow and symptoms
No other likely alternative diagnosis clinically diagnosed TB case
Gastric aspirate/induced sputum for CBNAAT
+ve
-ve
Refer to expert for work-up of persistent pneumonia
MTB detected
Microbiologically confirmed TB case

Diagnostic algorithm of Paediatric Pulmonary TB

CO-MORBIDITIES IN TB

- A strong association between active TB disease and other communicable diseases or NCDs that exercise a toll on the immune system.
- Common TB-NCD comorbidities include HIV, diabetes mellitus, smoking, alcohol-use disorders, chronic lung diseases, cancer and depression.
  i. TB +HIV
  ii. TB + Diabetes mellitus
  iii. TB + Covid → Latest

TB and HIV 00:01:00

- Most common opportunistic infection in HIV is **TB** in India
- Most common opportunistic injection in HIV is **pneumocystis carinii** in world
- HIV –TB collaboration in India
  i. All patients of TB should be referred to ICTC for screening of HIV
  ii. Patients of HIV based on certain criteria should be referred to RNTCP

Criteria for screening TB in HIV 00:04:00

- In adults
  i. Current cough

ii. Fever

iii. Weight Loss

iv. Night sweats

- In children

i. Current cough

ii. Fever

iii. Poor weight gain

iv. Contact with TB case

- HIV and tuberculosis interact in several ways:
- Reactivation of latent infection
- Primary infection
- Recurrent infection
- More cases in community

Diagnosis of TB in HIV

i. NAAT

ii. Microscopy not done because TB load is less in HIV patients

Treatment of HIV-TB Co-infection 00:06:10

- Cellular immunity is responsible for manifestations of TB
- In HIV as CD4 count is low, the symptoms of TB are minimal
- If a patient of HIV-TB is started on ART, cellular immunity increases and there is flaring up of

symptoms of TB, this is called **IRIS (immune Reconstitution inflammatory syndrome)**

- So, patient is started on ATT first, wait for 2 weeks -2 months then start ART
  - **i. If patients CD4 is less than 50, then start ART and ATT together simultaneously**
  - ii. A patient of HIV-TB is given cotrimoxazole prophylaxis treatment (CPT) 960mg/day in addition
  - **iii. Rifampicin is replaced by Rifabutin (150mg/day) because, rifampicin decreases bioavailability of other drugs**

Isoniazid Preventive Therapy (IPT)

- **Isoniazid preventive therapy (IPT) is one of the 3- I's (Intensified Case Finding (ICF), Isoniazid Preventive Therapy (IPT) and TB Infection Control (IC) for people living with HIV.) globally recommended for prevention of incident TB among HIV infected individuals.**
- Done in HIV patients who are TB negative as prophylaxis
  - In adult and pyridoxine
- INH 300mg + pyridoxine 50mg per day for 6 months
  - In children above 12 months

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- INH 10mg/kg + pyridoxine 25mg/day for 6 months

TB and diabetes mellitus

- Patients of DM are screened for TB based on certain criteria which are
  i. Cough > 2 weeks
  ii. Fever > 2 weeks
  iii. Significant weight loss
  iv. Night sweats
- National framework for joint TB-diabetes collaborative activities-
  a. Activities to improve diagnosis and management of diabetes among TB patients:
    - screening of all registered TB patients for diabetes mellitus.
    - ensuring diabetes mellitus management among TB patients.
  b. Activities to improve diagnosis and management of TB among diabetic patients:
    - Intensified detection of active TB disease among diabetic patients.
    - Ensuring TB infection control measures in health care settings where diabetes mellitus is managed.
    - Ensuring TB treatment and management in comorbid patients.

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c. Joint monitoring and evaluation.

d. TB patients diagnosed with diabetes should receive the same duration of TB treatment with daily regimen as non-diabetic patients.

TB and COVID 19 00:14:10

- Patients with TB are at higher risk of acquiring COVID 19
- Tuberculosis is associated with a 2.1-fold increased risk of severe COVID19 disease. In addition, TB patients also tend to have comorbid or living conditions (malnutrition, diabetes, smoking, HIV etc) that increase their vulnerability.
- Hence, all TB patients should be screened for TB
- 3 types of screening

  i. Bi – Directional TB – COVID screening

  ii. TB screening for ILI cases

  iii. TB screening for SARI cases

Bi-directional TB –COVID Screening- COVID screening for diagnosed TB patient

Diagnosed TB patient/Currently on TB treatment

↓

Testing for COVID-19

COVID-19 Positive **COVID-19 Negative**

↓

COVID-19 management as per MHFW guidelines & continue treatment for TB

↓

Continue treatment for TB

CRITERIA FOR SCREENING TB AMONG COVID

- Cough for > 2 weeks
- Fever for > 2 weeks
- Significant weight loss
- Night sweats
- History of contact with TB case
- History of TB

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TB screening for COVID positive patients–

COVID-19 Patient

↓

Screening for TB

↓

Chest X-ray & upfront NAAT (if screened +)

Diagnosed with TB

↓

Linkage with NTEP for TB management & continue COVID-19 management as per MOHfW guidelines

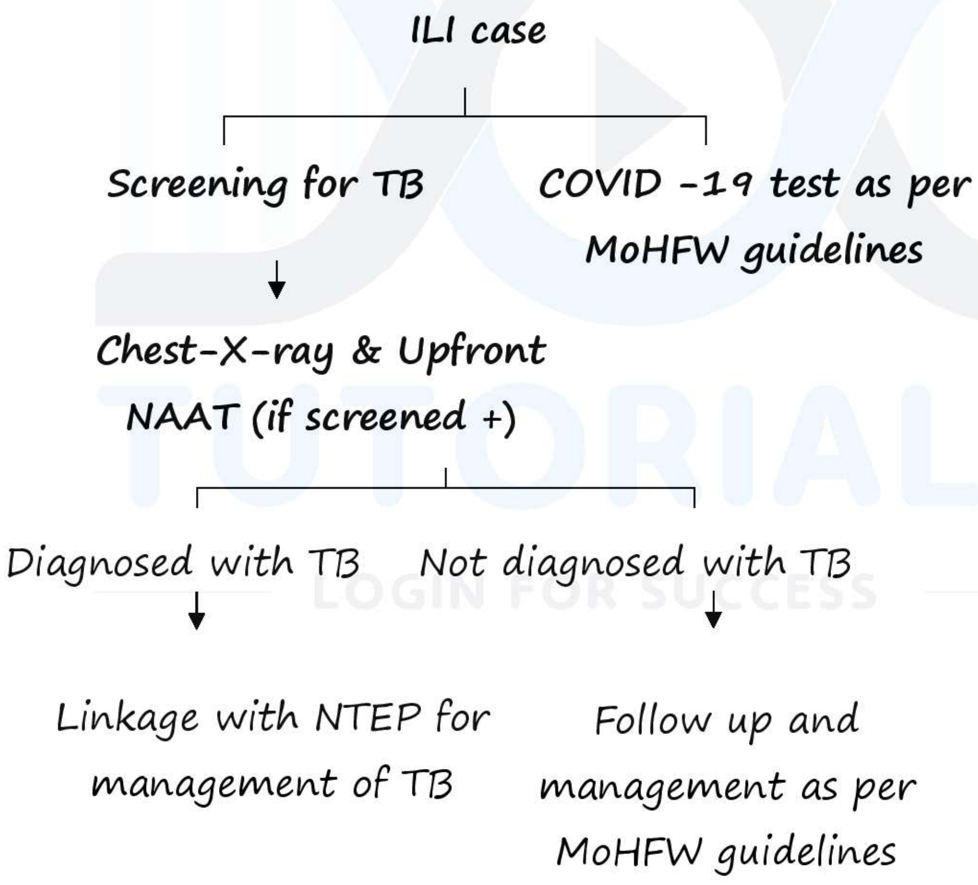
Not diagnosed with TB

↓

Follow & management as per MOHFW guidelines

Screening TB in ILI (Influenza Like Illness)

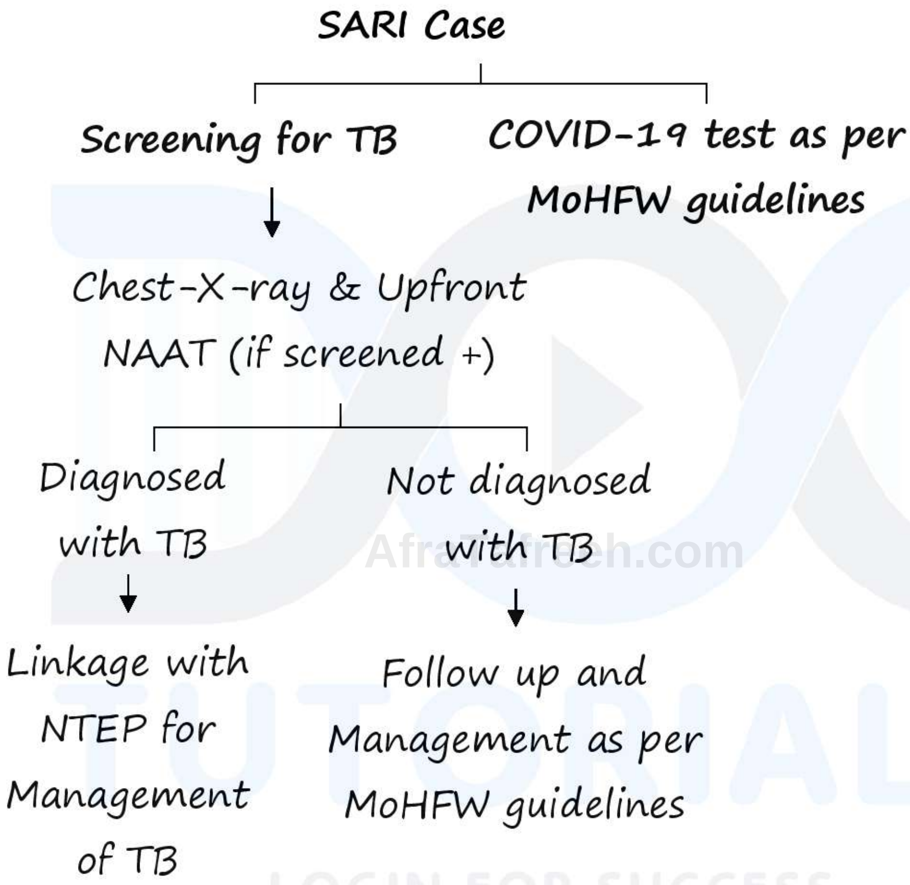
- Criteria
  - Cough for > 2 weeks
  - Fever for > 2 weeks
  - Significant weight loss
  - Night sweats
  - History of contact with TB case
  - History of TB
  - ILI symptoms persisting for > 10 days


ILI case
Screening for TB
COVID -19 test as per MoHFW guidelines
Chest-X-ray & Upfront NAAT (if screened +)
Diagnosed with TB
Not diagnosed with TB
Linkage with NTEP for management of TB
Follow up and management as per MoHFW guidelines

Screening TB in SARI (S)

- Criteria
  - Cough for > 2 weeks
  - Fever for > 2 weeks

- Significant weight loss
- Night sweats
- History of contact with TB case
- History of TB
- SARI symptoms persisting for > 10 days


SARI Case
Screening for TB
COVID-19 test as per MoHFW guidelines
Chest-X-ray & Upfront NAAT (if screened +)
Diagnosed with TB
Not diagnosed with TB
Linkage with NTEP for Management of TB
Follow up and Management as per MoHFW guidelines

ADVANCEMENTS IN TB TREATMENT

- Surveillance
- New technologies
- New strategies

Surveillance

i. Passive Surveillance
ii. Active surveillance
iii. Intensified TB Case finding (ICF)

Intensified TB case finding (ICF): 00:00:50

- Intensified case finding (ICF) is an activity intended to detect possible TB cases among people living with HIV as early as possible.
- For HIV TB (usually)
- But now for other high-risk groups also-

Clinical	Social	Geographical
Clients attending HIV care settings	Prisoners	Urban slums
Substance abuse including smokers	Occupations with risk of developing TB	Hard to reach areas

Co-morbidities like diabetes mellitus, malignancies, patients an dialysis and on long term immunosuppressant therapy	People in congregated settings-night shelters, de-addiction centrea, old age homes	Indigenous and tribal populations
Health Care Workers		
Household & workplace contacts		
Patients with past history of TB		
malnourished		
Antenatal mothers attending antenatal clinics/ MCH clinics		

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Latent TB 00:02:58

- Bacilli in dormant stage not showing signs and symptoms
  - i. PLVHA (People living with HIV, AIDS)
  - ii. Contacts of pulmonary TB cases
  - iii. Malnourished, DM, cancer treatment, dialysis, transplantation, silicosis

iv. Prisoners, health-care workers, immigrant from high TB burden countries, homeless persons and illicit drug users

Diagnosis

- Interferon gamma release assays/ tuberculin skin test
- **Interferon gamma release assays → whole blood test**

Treatment

i. Isoniazid daily for 6 to 9 months
ii. Rifampicin daily for 3-4 months
iii. Rifampicin and isoniazid daily for 3-4 months
iv. Rifapentine and isoniazid once a week for 3-4 months

DOT TUTORIALS LOGIN FOR SUCCESS

New technologies in RNTCP

Fig: 1

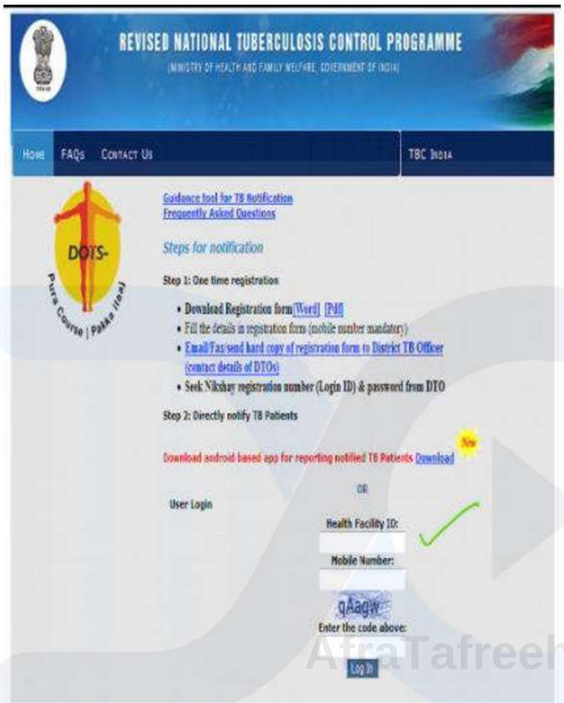
- Nikshay: Web based solution for monitoring TB patients

  ↓ ↓

- **Nil TB**

NIKSHAY
A web based solution for monitoring TB patients
DOTS-
Pura Course | Pakka Ilaaj

Fig: 2



REVISED NATIONAL TUBERCULOSIS CONTROL PROGRAMME
(MINISTRY OF HEALTH AND FAMILY WELFARE, GOVERNMENT OF INDIA)

Home
FAQs
Contact Us
TBC India
DOTS-
Pura Course | Pakka Ilaaj

Guidance tool for TB Notification
Frequently Asked Questions

Steps for notification

Step 1: One time registration

- Download Registration form [Word] [Pdf]
- Fill the details in registration form (mobile number mandatory)
- Email/Fax/send hard copy of registration form to District TB Officer (contact details of DTOs)
- Seek Nikshay registration number (Login ID) & password from DTO

Step 2: Directly notify TB Patients

Download android based app for reporting notified TB Patients Download

OR

User Login

Health Facility ID:

Mobile Number:

qAagw

Enter the code above:

Fig: 3

NIKSHAY AUSHADI 00:09:40

- Software to maintain the supply and availability of drugs lab consumers

EVERY DAY, TAKE 2 PILLS AND S
START

Fig: 4

99 DOTS 00:10:49

- Mobile App
- To ensure the patients treatment adherence or compliant of the patient to treatment

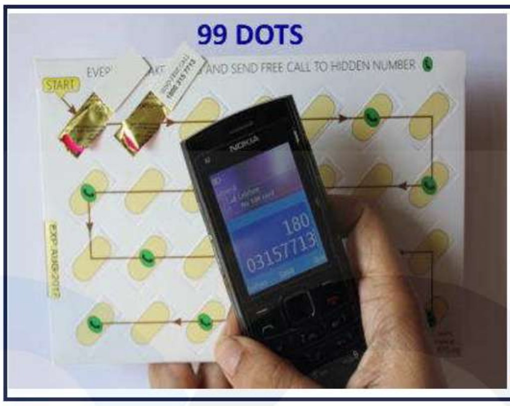
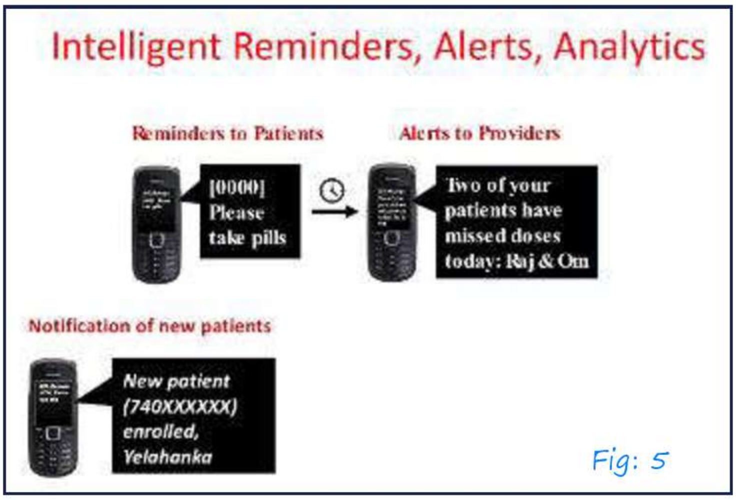

99 DOTS
START
AND SEND FREE CALL TO HIDDEN NUMBER
NOKIA
180
03157713

Fig: 5

- Daily 2/3 tablets need to be taken every alternate or 3rd tablet will have a phone number behind the strip
- Missed call should be given from the registered phone number to that number to ensure drug intake and once confirmed the call can be cut

Intelligent reminders, alerts

- Message will be sent to the registered mobile number to take the drug on time
- If we do not give the missed call. Alert message will be sent to the DOTS provider



Intelligent Reminders, Alerts, Analytics

Reminders to Patients

[0000] Please take pills

Alerts to Providers

Two of your patients have missed doses today: Raj & Om

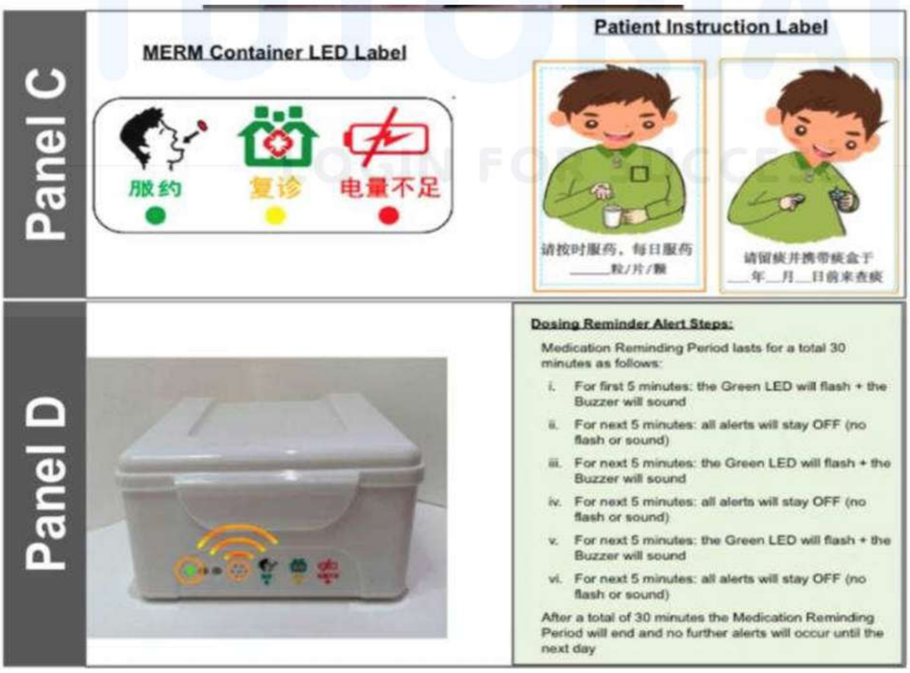
Notification of new patients

New patient (740XXXXXX) enrolled, Yelahanka

Fig: 5

- MERM (Medication Event-Reminder Monitor)

Fig: 6



Panel C
MERM Container LED Label
服约
复诊
电量不足
Patient Instruction Label
请按时服药，每日服药
____粒/片/颗
请留痰并携带痰盒于
___年__月__日前来查痰
Panel D

Dosing Reminder Alert Steps:

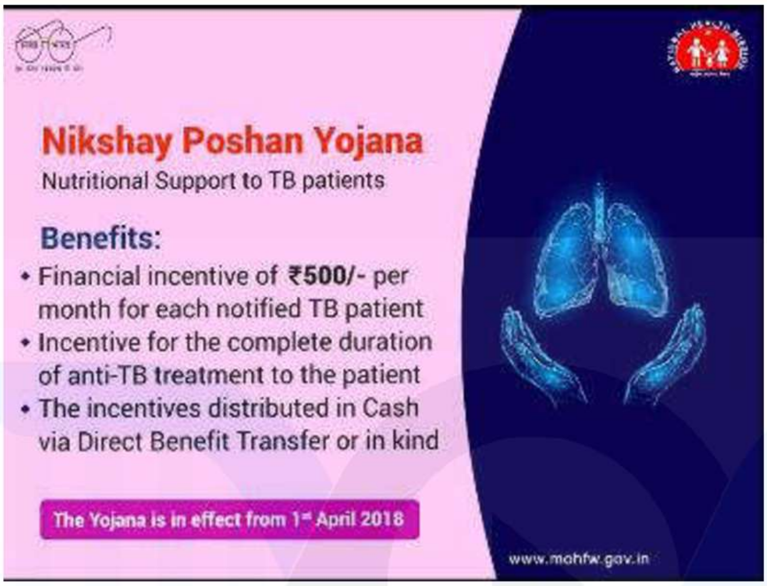
Medication Reminding Period lasts for a total 30 minutes as follows:

i. For first 5 minutes: the Green LED will flash + the Buzzer will sound
ii. For next 5 minutes: all alerts will stay OFF (no flash or sound)
iii. For next 5 minutes: the Green LED will flash + the Buzzer will sound
iv. For next 5 minutes: all alerts will stay OFF (no flash or sound)
v. For next 5 minutes: the Green LED will flash + the Buzzer will sound
vi. For next 5 minutes: all alerts will stay OFF (no flash or sound)

After a total of 30 minutes the Medication Reminding Period will end and no further alerts will occur until the next day

Fig: 7

- **Green light-Reminder or beep for medicine intake**
- **Yellow light-Need refill**
- **Red light light- Battery low**



Nikshay Poshan Yojana

Nutritional Support to TB patients

Benefits:

- Financial incentive of ₹**500/-** per month for each notified TB patient
- Incentive for the complete duration of anti-TB treatment to the patient
- The incentives distributed in Cash via Direct Benefit Transfer or in kind

The Yojana is in effect from 1st April 2018

www.mohfw.gov.in

Fig: 8

- Under the Nikshay Poshan Yojana government provide financial help to TB Patients for their treatment.
- The government provides Rs 500/- per month financial incentive to TB patients for their treatment and food.
- Nikshay Poshan Yojana Money will be transferred directly to the patient's bank account. This scheme is registered under Direct Benefit Transfer (DBT).

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TB-Notification 00:18:09

- **TB was made a notifiable disease in 2012. Notifiable diseases have to be reported to the authorities so that they can act in time to prevent or contain an outbreak.**
- Every health provider/Doctor supposed to notify about the patient (All the details) to the higher authority
  - For which we will be provided by incentives of: 1000rs
- **From March 16, 2018; if you fail to notify TB**
- **Imprisonment for 6 months – 2 years with or without fine (IPC 269 and 270)**
- IPC 269 & 270: Negligent act likely to spread serious infectious disease
- Healthcare providers to notify every tuberculosis patient to local public health authority

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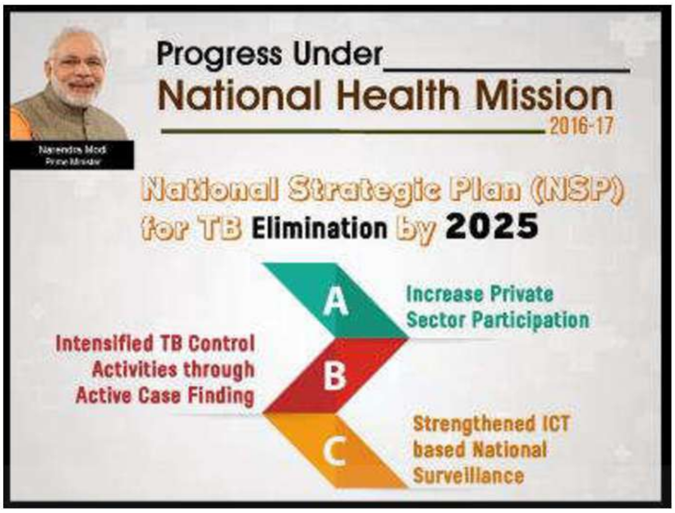
LOGIN FOR SUCCESS

General Responsive Framework

- Male
- Female
- Trans Gender
- Different set of questions and different approach for each and every gender



Progress Under

National Health Mission

2016-17

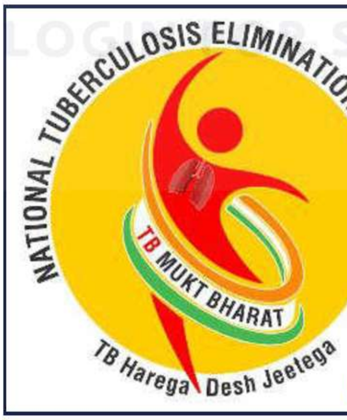
National Strategic Plan (NSP) for TB Elimination by 2025

Narendra Modi
Prime Minister
A
Increase Private Sector Participation
B
Intensified TB Control Activities through Active Case Finding
C
Strengthened ICT based National Surveillance

Fig: 9

ON JANUARY 1, 2010

- **RNTCP changed to NTEP NATIONAL TUBERCULOSIS ELIMINATION PROGRAMME by 2025**
- Pre-elimination phase → < 10 new TB cases per million people per year
- Elimination of TB → < 1 case per million people per year



NATIONAL TUBERCULOSIS ELIMINATION PROGRAMME
TB MUKT BHARAT
TB Harega Desh Jeetega

Fig: 10

- **The new National Tuberculosis Elimination Program(NTEP) launched with its new logo in early 2020.**

- Logo have been launched is circular with yellow and red colour. Name of program is in circular and with caption "TB Harega Desh Jeetega". There is red colour joyful person surrounded by National Flag with image of lung in the logo.

World TB Day 2020; 24th March

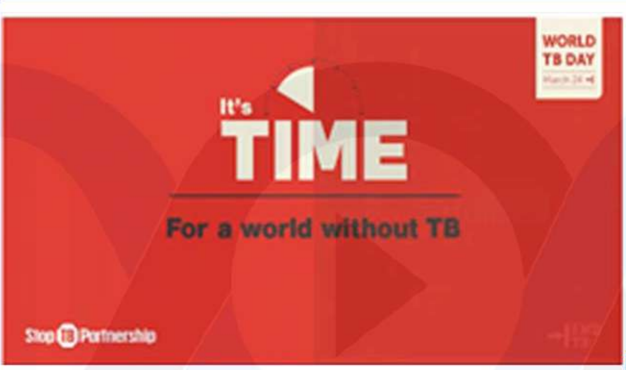

WORLD
TB DAY
March 24
It's
TIME
For a world without TB
Stop TB Partnership

Fig: 11

- THEME FOR 2020; IT'S TIME & SLOGAN IS FOR A WORLD WITHOUT TB
- The theme of World TB Day 2021 – 'The Clock is Ticking' –conveys the sense that the world is running out of time to act on the commitments to end TB made by global leaders.

HIV AND NACP

- NACP – National Aids Control Program
- The National AIDS Control Programme (NACP), launched in 1992, is being implemented as a comprehensive programme for prevention and control of HIV/ AIDS in India.
- NACP1-1992, NACPII-1999, NACP III-2007, NACP IV-2012

Diagnosis of HIV in adults 00:00:32

- It is diagnosed in ICTC – Integrated Counselling and Testing Centre
- Blood is taken and **three tests are done**

Result	**Interpretation**
If all three tests are positive	HIV positive
If all three tests are negative	HIV negative
One positive and two negatives	HIV negative
Two positive and one negative	Indeterminate

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- **In indeterminate results, tests are repeated again in 14 days.**
- **If patient continues to be indeterminate, blood is sent to APEX LAB.**

Diagnosis of HIV in children

- Dried Blood Test is performed in children
- It is a DNA PCR technique
- This test can diagnose HIV in children in just 6 weeks

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Treatment of HIV

- Start treatment irrespective of CD4 count
- Start treatment at the earliest and continue lifelong
- Drugs used - TEL -
  - **i. TENOFOVIR - 300 MG**
  - **ii. EFAVIRENZ - 600 MG**
  - **iii. LAMIVUDINE - 300 MG**
- A patient taking Anti-Retroviral Therapy (ART) should also take Co trimoxazole therapy (CRT) to prevent Pneumocystis carinii infection

Treatment of HIV in pregnancy

- **The drugs of choice are TEL**
- Start therapy at the earliest
- Continue treatment lifelong
- Caesarean section is not indicated

Treatment of HIV in children/neonates

- **Drug of choice is Nevirapine**
- Dose is 2mg/kg once daily for 6 weeks
- If the mother has not started ART, treatment is extended to 12 weeks
- **Child should also be given CPT (Cotrimoxazole prophylaxis therapy) therapy**

Post exposure prophylaxis 00:11:03

- **post-exposure prophylaxis, is a short course of HIV medicines taken very soon after a possible exposure to HIV to prevent the virus from taking hold in your body.**
- **Drug of choice is TEL.**
- Treatment should be started at the earliest. Ideally before 72 hours.
- **Follow up is done at the end of 6 weeks, 3 months, and 6 months.**

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Pre-exposure prophylaxis 00:13:38

- **pre-exposure prophylaxis, is an HIV prevention method in which people who don't have HIV take HIV medicine to reduce their risk of getting HIV if they are exposed to the virus.**

  i. Tenofovir 300 mg + Emtricitabine 200 mg orally

  ii. Tenofovir topically as vaginal gel

90-90-90 Target 00:14:07

- WHO introduced this regimen in 2017.
- By 2020, 90% of all people living with HIV will know their HIV status
- 90% of all people with diagnosed HIV infection will receive sustained antiretroviral therapy
- 90% of all people receiving antiretroviral therapy will have viral suppression

Global prevalence of HIV 00:14:57

i. South Africa –Highest
ii. Nigeria
iii. India

Prevalence in INDIA 00:15:50

- High risk groups –
- Intravenous drug users have the highest prevalence 6.26% >
- Transgender population 3.14% >
- Male homosexuality 2.69% >
- Female sex workers 1.56% >
- Bridge population –
- Long distance truckers 0.86% >
- Single male migrants 0.51%

Prevention of HIV 00:18:45

- Surveillance
- AVAHAN program
- AIDS vaccine
- **HIV surveillance is one of the first interventions under the national AIDS response. (Sero surveillance, behavior surveillance, sentinel surveillance etc)**

AVAHAN program:

- Intervention for high-risk groups to help them stay negative
- It is also known as targeted intervention
- Sex workers – Condom promotion
- Male homosexuality – Lubricants
- Intravenous drug users – Free needles and syringes – Needle Syringe Exchange Program
- The strategy is risk reduction

Surveillance:

- Sentinel surveillance –
  - The objective is to know prevalence in high-risk groups, bridge population, and general population.
  - To know the general trend., geographical spread
  - It is done every 2 years.

- It is done by taking blood samples from high risk groups, bridge population, and a proxy of general population – antenatal mothers.

	High risk groups: IDU/MSM/FSW/TG	Bridge population: SMM/LDT	General population: Pregnant women attending ANC clinics
Sentinel site	Targeted interventions (TI) projects	STD clinic, TI projects	Antenatal clinic
Sample size	250	250	400
Duration	3 months	3 months	3 months
Frequency	Once in 2 years	Once in 2 years	Once in 2 years
Sampling method	Consecutive/random	Consecutive	Consecutive
Age group	15-49 years	15-49 years	15-49 years
Testing strategy	Unlinked anonymous with informed consent	Unlinked anonymous at STD, with informed consent at TI sites	Unlinked anonymous
Blood specimen	Dried blood spot	Serum at STD, DBS at TI sites	Serum
Testing protocol	Two test protocol	Two test protocol	Two test protocol

SMM- Single male migrants, LDT -Long distance truckers

HIV/AIDS vaccines

- There are five upcoming vaccines – CRAMS –
  i. Cytotoxic T – Lymphocytes (CTL) inducing vaccines.
  ii. Recombinant Adeno associated virus (RAAV) vaccine.
  iii. AIDSVAX (Only vaccine in phase 3 trials)
  iv. Modified Vaccinia ANKARA (MVA) vaccine
  v. Subunit vaccine

World Aids Day

- It is on December 1st every year.
- Theme in 2019 – "Communities make the difference."
- The colour of the AIDS ribbon is red.
- On World AIDS Day 2020, WHO is calling on global leaders and citizens to rally for "global solidarity" to overcome the challenges posed by COVID-19 on the HIV response. WHO has chosen to focus on "Global solidarity, resilient HIV services" as the WHO theme

Other colored ribbons

- Pink ribbon is for Ca breast.
- Blue and pink ribbon is for male Ca breast.
- Black ribbon is for melanoma and for prevention of suicide.

TUTORIALS LOGIN FOR SUCCESS

- Zebra ribbon is for rare diseases.
- Puzzle ribbon is for autism.

Achievements

- Cuba is the first country to receive WHO validation for eliminating mother to child transmission of HIV and syphilis
- Thailand is the first country in Asia to eliminate mother to child transmission of HIV and syphilis
- Syndromic management of STI/RTI with Color Coded Kits

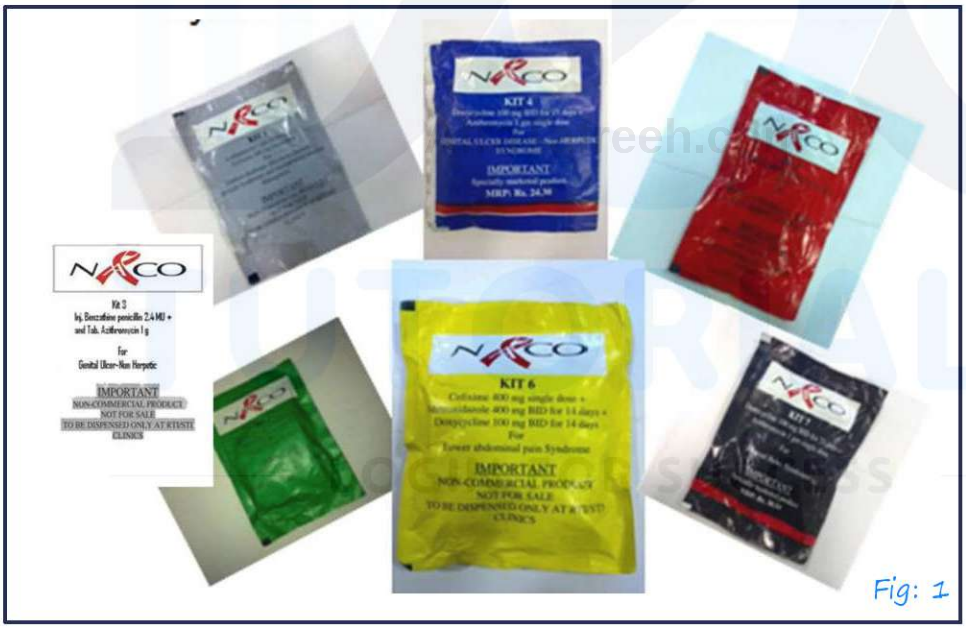

NACO
KIT 4
IMPORTANT
MRP: Rs. 24.30
Kit 3
Inj. Benzathine penicillin 2.4 MU +
and Tab. Azithromycin 1 g
for
Genital Ulcer-Non Herpetic
IMPORTANT
NON-COMMERCIAL PRODUCT
NOT FOR SALE
TO BE DISPENSED ONLY AT RTI/STI CLINICS
KIT 6
For
Lower abdominal pain Syndrome
IMPORTANT
NON-COMMERCIAL PRODUCT
NOT FOR SALE
TO BE DISPENSED ONLY AT RTI/STI CLINICS

Fig: 1

STD 00:36:54

KIT 1	Urethral, Anorectal discharge and cervicitis
KIT 2	Vaginitis

KIT 3	Genital ulcer non herpetic
KIT 4	Genital ulcer non herpetic (Allergic to penicillin)
KIT 5	Genital ulcer herpetic
KIT 6	Lower abdominal pain
KIT 7	Inguinal bubo

Clinical Condition	Kit to be prescribed	Drugs included	Image
Urethral or Anorectal or Cervical discharge	KIT 1: Gray	Tab Azithromycin 1 g (1 tab) Tab Cefixime 400 mg (1 tab)	
Vaginal Discharge (Vaginitis)	KIT 2: Green	Tab Secnidazole 2 g (1 tab) Tab Fluconazole 150 mg (1 tab)	
Genital Ulcer Disease (Non Herpitic)	KIT 3: White	Inj. Benzathine Penicillin 2.4 MU (1 vial) + Tab Azithromycin 1 g (Kit also contains 10 ml disposable syringe+ 21 gauge needle + 1 vial of 10 ml sterile water	
Genital ulcer disease (nonherpetic) in patient allergic to penicillin	KIT 4: Blue	Tab Doxycycline 100 mg (1 tab BD for 14 days) Tab Azithromycin 1 g x 1 tab	
Genital ulcer disease (Herpetic)	KIT 5: Red	Tab Acyclovir 400 mg x 1 tab TDS x 7 days	
Lower abdominal pain (Pelvic Inflammatory Disease)	KIT 6: Yellow	Tab Cefixime 400 mg x 1 tab Tab Metronidazole 400 mg x (1 BD 14 days) Tab Doxycycline 1 g (1 BD 14 days)	
Inguinal Bubo	KIT 6: Black	Tab Doxycycline 100 mg (1 BD x 21 days) Tab Azithromycin 1 g x 1 tab	

NCD CONTROL PROGRAMS

(NON-COMMUNICABLE DISEASE)

- BMI of 23 Kg/m^2 → overweight (earlier 25)
- BMI of 25 Kg/m^2 → obese (earlier 30)

For INDIANS 00:01:30

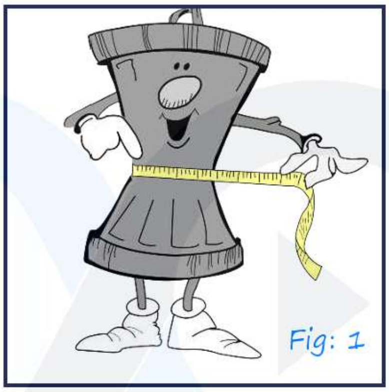


Fig: 1

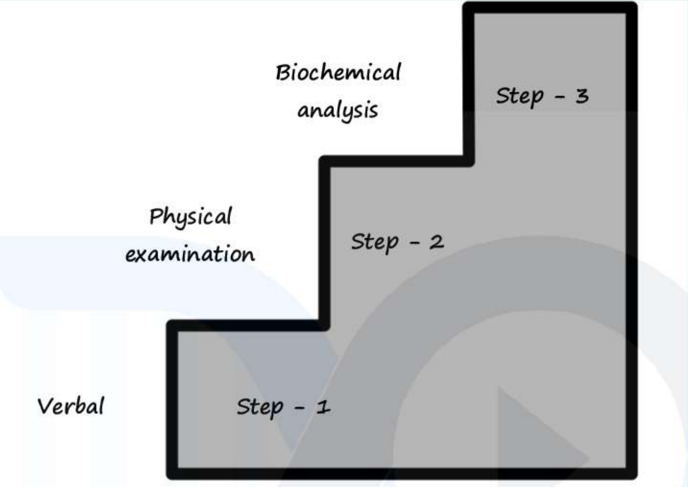
- Cutoff for waist circumference considered as unhealthy for Male → 90cms.
- Cutoff for waist circumference considered as unhealthy for Female → 80cms.

At global level 00:02:01

- Cutoff for waist circumference considered as unhealthy for Male → 102cms
- Cutoff for waist circumference considered as unhealthy for Female → 88cms

Steps approach 00:02:26

- The WHO STEPwise Approach to NCD Risk Factor Surveillance (STEPS) is a simple, standardized method for collecting, analysing and disseminating data on key NCD risk factors in countries


Biochemical analysis
Step - 3
Physical examination
Step - 2
Verbal
Step - 1

Steps approach for NCD Fig:

- To assess prevalence of NCD risk factors
- 3 different steps
  - STEP 1 → verbally → age, gender, risk factors running in family, past history etc
  - STEP 2 → physical examination → height, weight, BMI, BP etc
  - STEP 3 → Biochemical analysis → Blood sugar, LDL, HDL etc

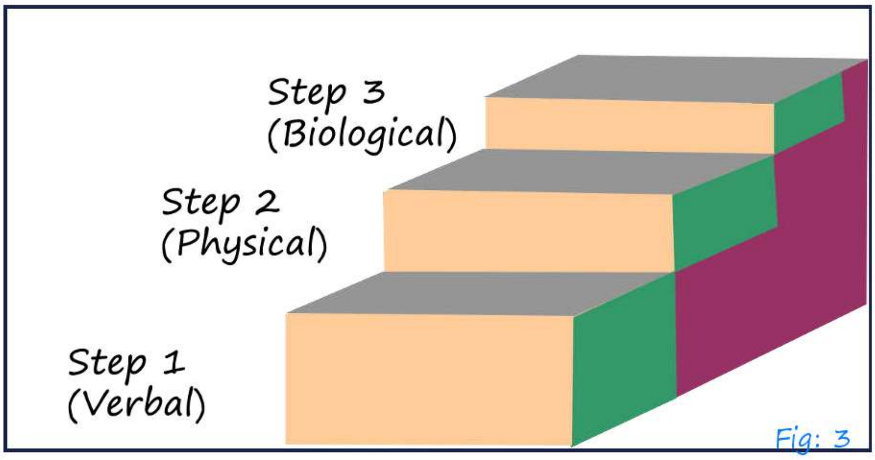

Step 3
(Biological)
Step 2
(Physical)
Step 1
(Verbal)

Fig: 3

COMMUNICABLE DISEASE CONTROL PROGRAM AND NCD CONTROL PROGRAM

Crimean – Congo hemorrhagic fever (CCHF) 00:00:18

- Caused by **hard tick** of genus **Hyalomma are principal vector of CCHF**

Fig: 1

- Can be transmitted from infected cattle/sheep

TUTORIALS LOGIN FOR SUCCESS

Ebola hemorrhagic fever 00:02:05

- Caused by **Ebola virus**: causes an acute, serious illness which is often fatal if untreated.
- EVD first appeared in 1976 in 2 simultaneous outbreaks, one in what is now Nzara, South Sudan, and the other in Yambuku, DRC.
- The latter occurred in a village near the Ebola River, from which the disease takes its name.

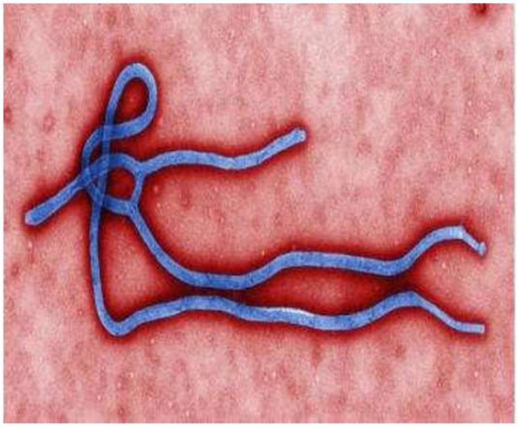


Fig: 2

- Clinical features
  - 1-2 weeks – prodromal features -Nausea, vomiting and diarrhea affecting liver and kidneys
  - Affected people bleed both internally and externally
- Reservoir of virus – **Bats**
- Transmission
  - Body fluid and blood
  - No airborne transmission
- Epidemic in Africa – Risk factor was eating bush meat – animals found dead in the forest
- Prevention
  - No vaccines
  - Properly cooking meat
  - Wearing PPE and washing hands
  - Handling body fluids and tissue with caution
- Recent findings
  - Virus can survive in semen and eye fluids
  - Can cause Guillain – Barre syndrome

NIPAH Virus 00:06:47

- It is a zoonotic illness that is transmitted to people from animals, and can also be transmitted through contaminated food or directly from person-to-person.
- In infected people, it causes a range of illnesses from asymptomatic (subclinical) infection to acute respiratory illness and fatal encephalitis. The virus can also cause severe disease in animals such as pigs, resulting in significant economic losses for farmers.
- Causes severe illness characterized by
  i. Inflammation of brain
  ii. Respiratory diseases
- Transmitted
  - Humans from animals (**pheropus fruit bat**)

Fig: 3

- Also, directly from human – to – human

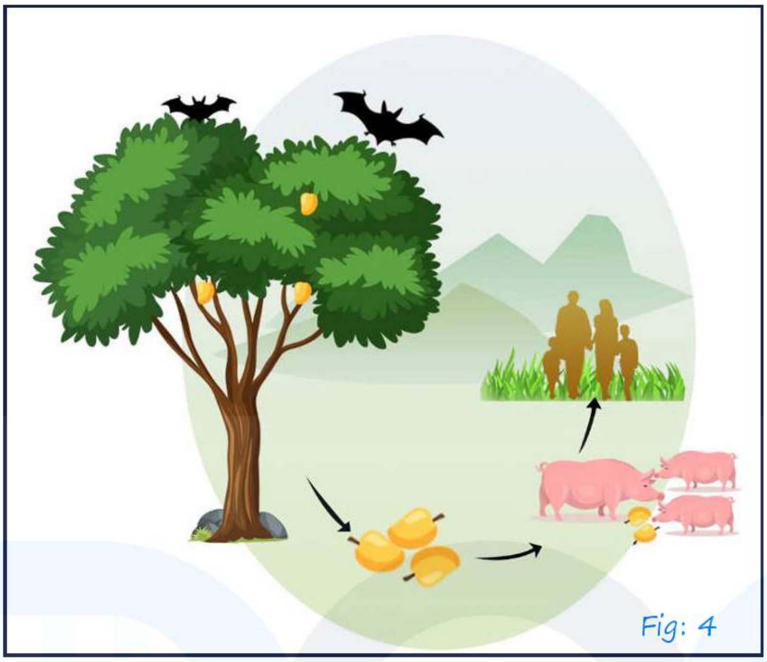


Fig: 4

- Can cause severe disease in domestic animals such as pigs
- No vaccine or treatment available for either people or animals

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Covid -19 00:11:31

- Coronavirus disease (COVID-19) is an infectious disease caused by the SARS-CoV-2 virus
- Events –

↓

31 December 2019 – Pneumonia of unknown etiology in Wuhan city, Hubei province of China

↓↓

7th January 2020 – named as novel corona virus 2019 in China

↓↓

11 January 2020 – First fatal case reported

↓↓

30 January 2020 – Public health emergency of international concern

↓↓

11 February 2020 – WHO → covid – 19

↓↓

11th March 2020 – WHO declared covid-19 as a pandemic

- First case of covid-19 was reported in Kerala (Thrissur) on **30 January 2020**
  - Covid-19 is a zoonotic virus
  - Reservoir – bats/pangolin
  - Mean incubation period → **5-6 days (1-14 days)**
  - Case fatality: **0.3-1%**
  - Infectivity – maximum in the initial days (becoming less infective after 10 days)
  - Routes of transmission
    - Droplets/fomites
    - Not airborne
    - Human-to-human

DOC TUTORIALS LOGIN FOR SUCCESS

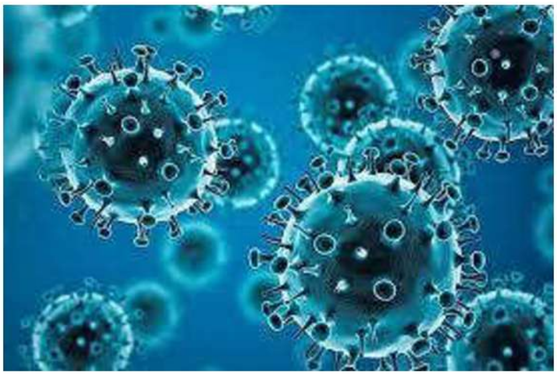
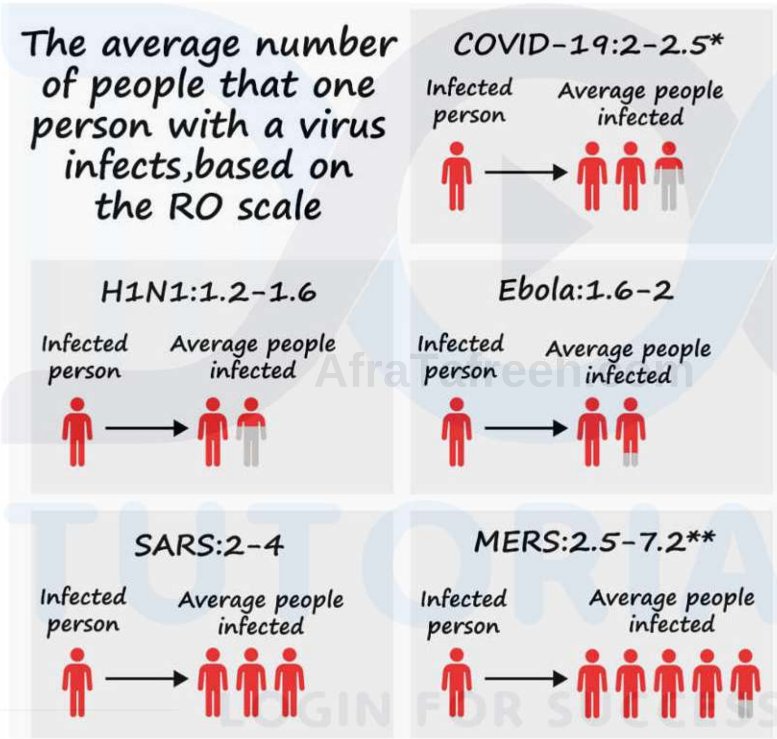


Fig: 5

- R naught/RO/Basic Reproduction number


The average number of people that one person with a virus infects,based on the RO scale
COVID-19:2-2.5*
Infected person
Average people infected
H1N1:1.2-1.6
Infected person
Average people infected
Ebola:1.6-2
Infected person
Average people infected
SARS:2-4
Infected person
Average people infected
MERS:2.5-7.2**
Infected person
Average people infected

AfraTanveer.com
TUTORIALS
LOGIN FOR SUCCESS

Fig: 6

- Symptoms
  - Fever
  - Dry cough
  - Fatigue
  - Sore throat
  - Rash on skin
  - SOB

  - Chest pain
  - Myalgia
  - Diarrhea
  - Conjunctivitis
  - Headache
  - Loss of taste/smell
  - Loss of speech
- Transmission scenarios WHO
  - No cases
  - Sporadic
  - Clusters
  - Community transmission
  - Endemic
- Preventive measures
  - SMS
    - Soap
    - Mask
    - Social distancing

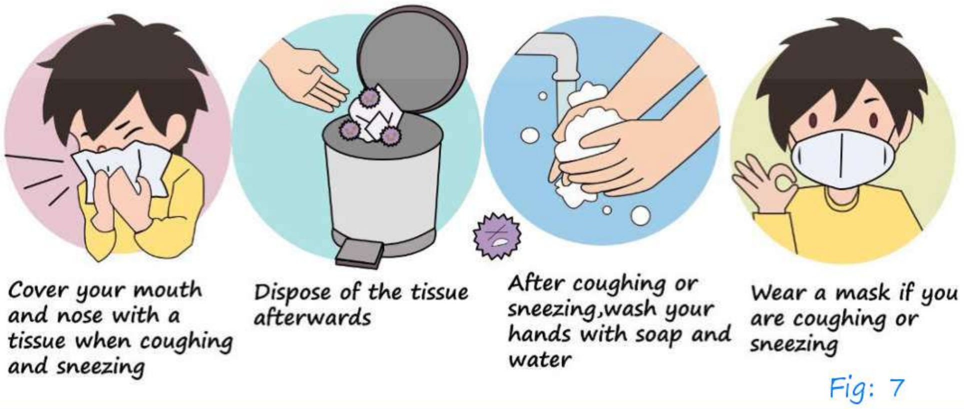

Cover your mouth and nose with a tissue when coughing and sneezing
Dispose of the tissue afterwards
After coughing or sneezing,wash your hands with soap and water
Wear a mask if you are coughing or sneezing

Fig: 7

  - Quarantine
  - Isolation for infected

- Preventive public health measures

H1 N1 00:24:04

- Treatment: -

  i. Drug of choice – Oseltamivir 75mg
  BD x 5 days

  ii. Zanamivir
  - Adults and children above 5 years
  - Not used in India

- Prophylaxis: -

  i. Drug of choice – Oseltamivir 75mg
  OD x 10 days

ZIKA Disease 00:26:34

- Caused by – **Aedes mosquito**
- Clinical features
  - Usually causes prodromal symptoms
  - In pregnant women → can cause microcephaly

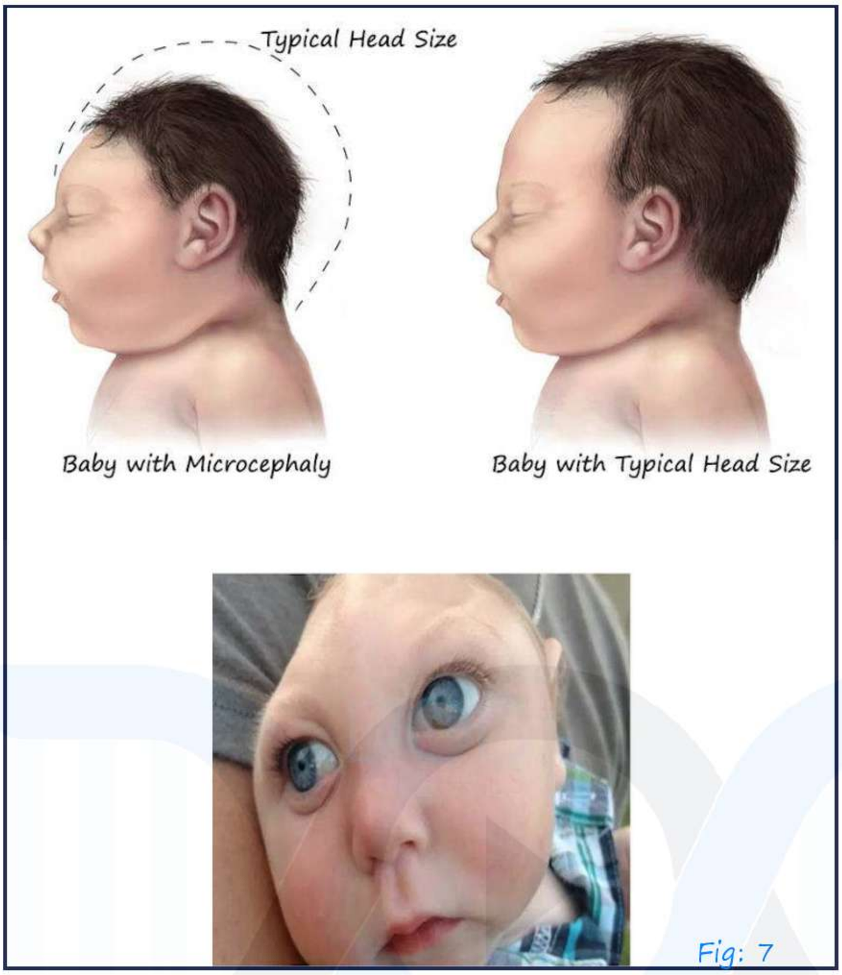

Typical Head Size
Baby with Microcephaly
Baby with Typical Head Size

Fig: 7

- Transmission

  i. Through mosquito bite

  ii. Mother to child (vertical route of transmission)

  iii. Through sexual contact

  iv. Through blood transfusion

- Last seen in Jaipur

BLINDNESS AND COMMUNICABLE DISEASES CONTROL PROGRAM

National blindness control program 00:00:10

- National Programme for Control of Blindness and Visual Impairment (NPCB&VI) was launched in the year 1976 as a 100% centrally sponsored scheme (now 60:40 in all states and 90:10 in NE States) with the goal of reducing the prevalence of blindness to 0.3% by 2020

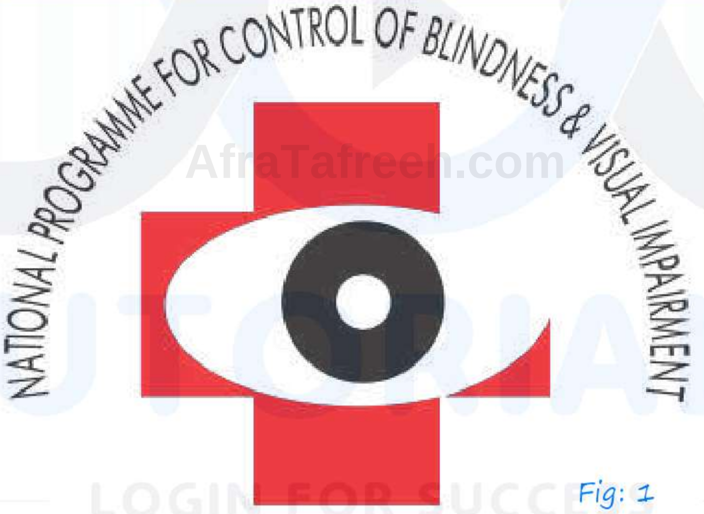

NATIONAL PROGRAMME FOR CONTROL OF BLINDNESS & VISUAL IMPAIRMENT

Fig: 1

- New Definition of blindness as per NBCP: Visual acuity less than 3/60.
- The new name of the program is now National Program for Control of Blindness and Visual Impairment.
- Visual impairment: it is defining as visual acuity between 6/18 and 3/60

- Highest Prevalence of blindness is in Jammu and Kashmir.
- Lowest prevalence of blindness is in Meghalaya

Types of blindness based on causes 00:01:57

i. Type 1 – it is due to obvious lesions in cornea.

ii. Type 2 – it is due to lens opacities.

iii. Type 3 – due to some identifiable cause

iv. Type 4 – due to unidentifiable/unspecified cause.

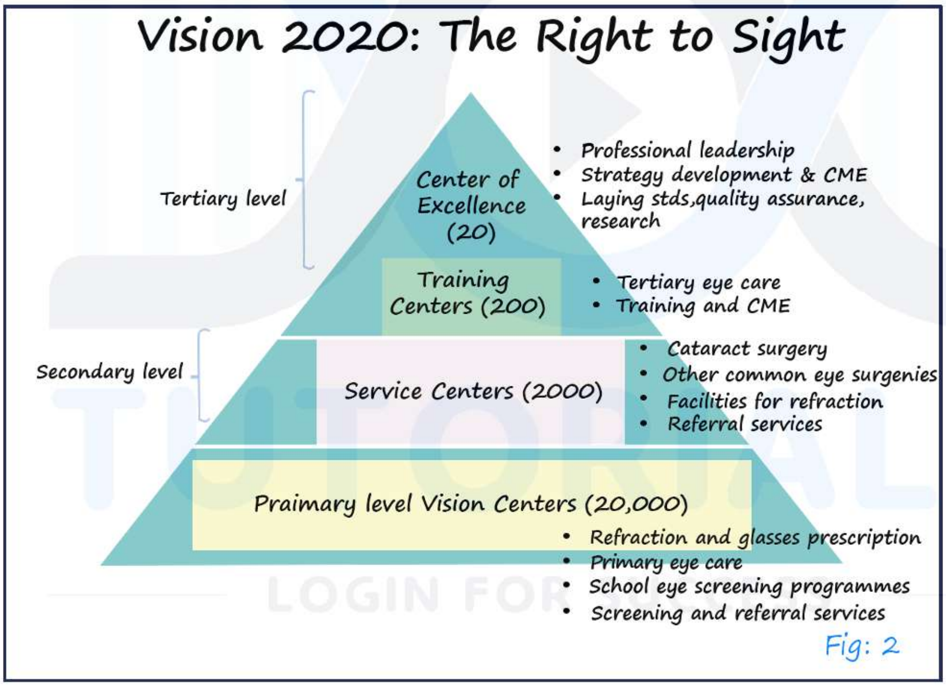

Vision 2020: The Right to Sight
Tertiary level
Center of Excellence (20)
• Professional leadership
• Strategy development & CME
• Laying stds,quality assurance, research
Training Centers (200)
• Tertiary eye care
• Training and CME
Secondary level
Service Centers (2000)
• Cataract surgery
• Other common eye surgenies
• Facilities for refraction
• Referral services
Praimary level Vision Centers (20,000)
• Refraction and glasses prescription
• Primary eye care
• School eye screening programmes
• Screening and referral services

Fig: 2

- Vision 2020: The Right to Sight
- Global initiative by WHO to reduce avoidable blindness by 2020
  - Target diseases
  - Cataract
  - Refractive errors

- Glaucoma
- Diabetic retinopathy

National vector borne disease control program (NVBDCP) 00:03:53

राष्ट्रीय वैक्टर जनित
रोग नियंत्रण कार्यक्रम
NVBDCP

Fig: 3

There are 6 Vector borne diseases coming under NVBDCP

i. Malaria
ii. Filariasis
iii. Dengue
iv. Japanese Encephalitis
v. Leishmaniasis/ kala azar
vi. Chikungunya

MALARIA 00:05:07

- Recent guidelines: No presumptive treatment should be done. (Due to chloroquine resistance)
- Treatment is based on diagnosis / clinical suspicion.
- NVBDCP has introduced Rapid diagnostic kit.

QDx
MALARIA
Pv/Pf
C
Pv
Pf

Fig: 4

- RDK detects P. Vivid and P. falciparum alone
- Under NVBDCP we have free drugs given for P. vivax and P. falciparum
- RDK gives the result in 3-5min
- It is an antigen detection test

TUTORIALS LOGIN FOR SUCCESS

Treatment 00:09:17

Case of P. Vivax

- Drug of choice is chloroquine given for 3 days.
- Day1 - 10mg /kg
- Day 2 - 10mg/kg
- Day 3 - 5mg/kg
- Primaquine - 0.25mg/kg for 14 days.

- Primaquine is given for 14 days to eliminate the hypnozoites present in the liver preventing a relapse.

Case of P. Falciparum

- Drug of choice is ACT (artesunate combination therapy)
- Combination is ACT-SP where ACT is artesunate and SP is sulfadoxine pyrimethamine
- Day1 - Artesunate 4mg/kg/day
- Day2 - Artesunate 4mg/kg/day
- Day3 - Artesunate 4mg/kg/day
- Sulfadoxine- 25mg/kg /day given ON DAY 1
- Pyrimethamine 1.25mg/kg/day given ON DAY 1
- Primaquine 0.75mg/kg/day on DAY 2
- Case of COMBINED INFECTION (p. vivax +p. falciparum)
- Drug of choice is ACT+ primaquine 0.25mg/kg for 14 days
- Case of NONE ie. no malarial parasite in the blood - No anti-malarial is to be given, we evaluate other reasons

North eastern states

- For Patients from North eastern states, we don't give ACT-SP.
- We give ACT-AL
- For 5-15yrs-

- Artemether - 20mg + Lumefantrine - 120mg twice daily (BD) for 3 days
- As age advances number of tablets required increases.

Malaria treatment in Pregnancy 00:19:32

- P. vivax- we give chloroquine alone
- P. Falciparum- 1st trimester quinine
- 2nd trimester ACT
- 3rd trimester ACT

Complicated malaria 00:21:00

- Parenteral treatment (iv) for first 24-48hrs
- iv quinine or iv artemisinin derivatives
- Once patients start tolerating oral drugs, we can switch over to oral treatment
- If pt. was given iv quinine switch to oral quinine
- If it was on iv Artemisinin derivative then continue artemisinin derivative orally.

Chemoprophylaxis in malaria 00:22:24

- It is given to those who are travelling to endemic areas.
- Chemo prophylaxis is divided into two depending on duration:

  i. Short term chemoprophylaxis

ii. Long term chemoprophylaxis

Short term chemoprophylaxis is less than 6 weeks

- Drug of choice in short term is Doxycycline 100mg daily
- Start 2 days before travel and continue till 4 weeks after coming back

Long term chemoprophylaxis is more than 6 weeks

- **Drug of choice is Mefloquine 5mg/kg weekly**
- Start 2 weeks before and continue till 4 weeks after returning

Surveillance: 00:26:00

DOC TUTORIALS LOGIN FOR SUCCESS

- ABER (annual blood examination rate)- 10%
- MBER (monthly blood examination rate)
- It consists of transmission months and non-transmission months
- For transmission months it is 1.2% to 1.8%
- For non-transmission months it is 0.8%

Remote sensing

- Sensing vector habitats from a remote (far off) area using infrared and electromagnetic waves.
- It is for controlling and preventing vector borne diseases.

World malaria Day 00:30:16

- It is on April 25th
- 2020 theme: zero malaria starts with me
- The theme of World Malaria Day 2021 is "Reaching the zero-malaria target."

Malaria vaccine

- Target age group is children aged 6 weeks to 17 months.
- 3 doses given primarily followed by booster after 18 months
- It is even as Intra muscular injection
- A malaria vaccine is a vaccine that is used to prevent malaria. The only approved vaccine, as of 2021, is RTS, S, known by the brand name Mosquirix

TUTORIALS LOGIN FOR SUCCESS

Dengue Vaccine

- A vaccine to prevent dengue (Dengvaxia®) is licensed and available in some countries for people aged 9 to 45 years. The World Health Organization recommends that the vaccine only be given to persons with confirmed previous dengue virus infection.
- It is called Dengue vaccine - it is the first vaccine against dengue.

- Produced by Sanofi Pasteur institute

Dengvaxia
Dengvaxia
Dengvaxia
Sanofi Pasteur

Fig: 5

Dengue Vaccine

- Live recombinant tetravalent dengue vaccine
- Target age 9 to 45 years
- Given as 3 dose s/c on 0,6,12-month schedule

REPRODUCTIVE & CHILD HEALTH

12 X 12 initiative 00:00:30

- Every child by the age of 12 years, should have a Hemoglobin value of **12 gm%** or higher

Oral Abortifacient 00:01:00

- Mifepristone (RU 486)- 200mg + Misoprostol (200 µg)- 4 tablets
- Schedule- mifepristone 200 mg orally
  Vaginal Misoprostol 800 µg
  Ultrasound after 14 days
  If anything left, manually curette it out

DOC TUTORIALS
LOGIN FOR SUCCESS

RMNCH + A (Reproductive Maternal Neonatal Child health + Adolescent 00:04:50

- National Iron + initiative- iron and Folic Acid tablets for adolescents- **BLUE** in Colour
- Deworming biannually- **February 10th- a.k.a. National Deworming day**
  - August 10th
- Pregnancy diagnosis kits- Nischay (confirms the pregnancy)
- Sanitary Napkin- **Free days (Costs 6 rs/ with 6 pads in it, each 1 rs.)**

Anemia Mukt Bharat 00:10:23

- A.k.a. **intensified iron-plus initiative**
- Objective → To reduce prevalence of anemia by **3% every year** in children, adults and adolescents between 2018 and **2022**

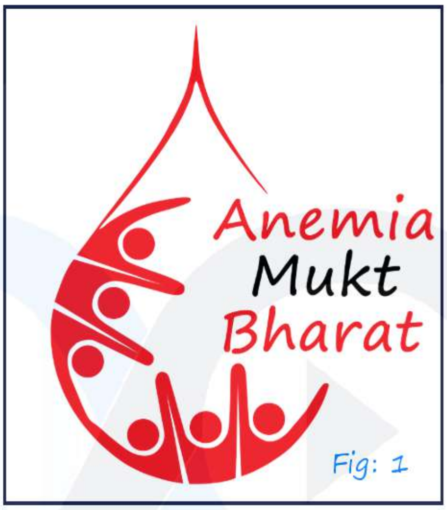
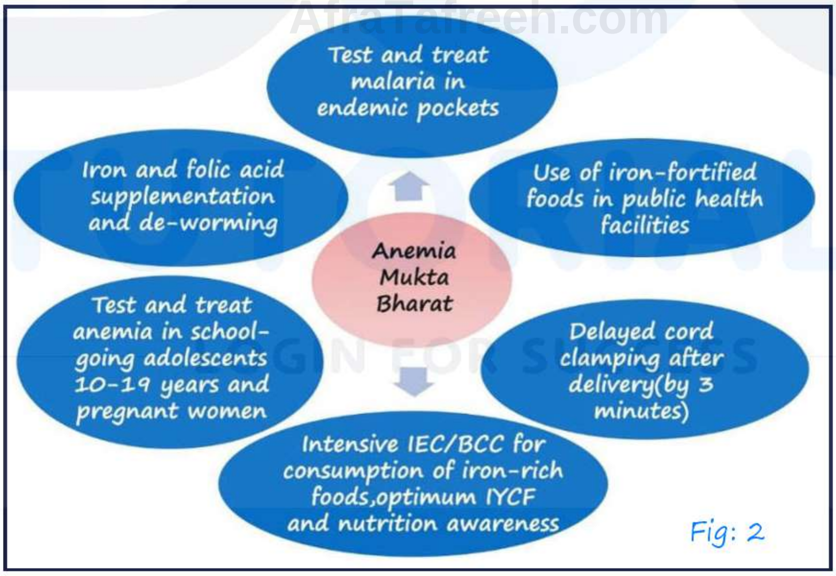


Fig: 1


Anemia Mukta Bharat

- Test and treat malaria in endemic pockets
- Use of iron-fortified foods in public health facilities
- Delayed cord clamping after delivery(by 3 minutes)
- Intensive IEC/BCC for consumption of iron-rich foods,optimum IYCF and nutrition awareness
- Test and treat anemia in school-going adolescents 10-19 years and pregnant women
- Iron and folic acid supplementation and de-worming

Fig: 2

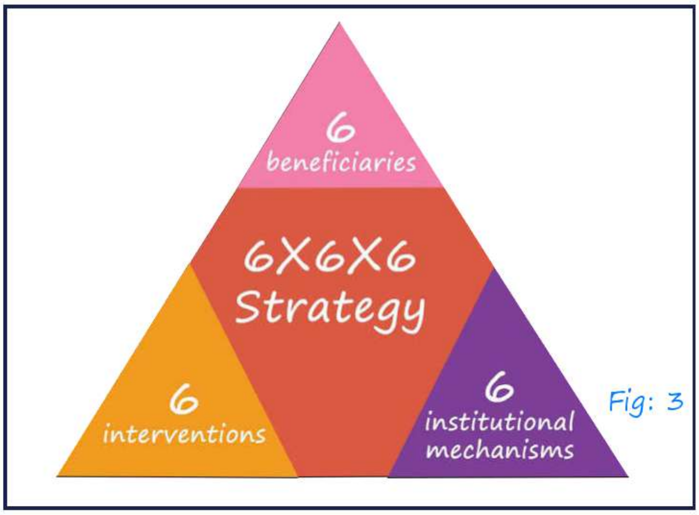

6
beneficiaries
6X6X6
Strategy
6
interventions
6
institutional
mechanisms

Fig: 3

Poshan Abhiyaan 00:13:34

POSHAN
Abhiyaan
PM's Overarching
Scheme for Holistic
Nourishment
सही पोषण - देश रोशन

Fig: 4

- Comes under Ministry of women & child development
- Objectives → **Attainment of malnutrition free India by 2022**
- To reduce stunting by improving anganwadi services

Pradhan Mantri Matritva Vandana Yojana (PMMVY) 00:14:55

प्रधानमंत्री मातृ वंदना योजना
मातृ शक्ति, राष्ट्र शक्ति

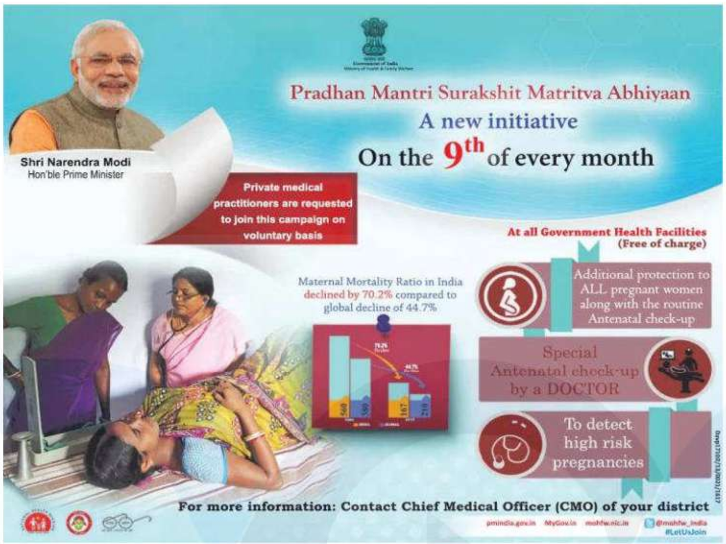
Fig: 5

- Earlies it was known India Gandhi matritva sahyog yojana (IGMSY)
- 5000rs for pregnant women for the first living child (Only once)
- Conditional maternity benefit scheme
- Given in 3 installments
  - **1st installments – 1000rs in early pregnancy (After registration)**
  - **2nd Installment – 2000rs after 6 months (at least after 1 ANC)**
  - **3rd Installment – 2000rs Registering after birth & after baby's first immunization. (1st cycle)**

PM Surakshit Maithrithva Abhiyan 00:20:49

- 9th of every month, fully free Obstetric/ Ultrasound/ Urine/ blood tests are given to pregnant women for free

- Only given in the **second and third trimester**
- Private practitioners are requested to join the campaign



Shri Narendra Modi
Hon'ble Prime Minister

Pradhan Mantri Surakshit Matritva Abhiyaan
A new initiative
On the 9th of every month

Private medical practitioners are requested to join this campaign on voluntary basis

Maternal Mortality Ratio in India declined by 70.2% compared to global decline of 44.7%

At all Government Health Facilities (Free of charge)

Additional protection to ALL pregnant women along with the routine Antenatal check-up

Special Antenatal check-up by a DOCTOR

To detect high risk pregnancies

For more information: Contact Chief Medical Officer (CMO) of your district

Fig: 6

Janani Shishu Suraksha Karyakram (JSSK)

00:23:14

Fig: 7

- Absolutely free and no expense delivery including CS

- Even for the baby, all care required till 1 year of age is free
  - The following are the Free Entitlements for pregnant women: -
  - Free and cashless delivery
  - Free C-Section
  - Free drugs and consumables
  - Free diagnostics
  - Free diet during stay in the health institutions
  - Free provision of blood
  - Exemption from user charges
  - Free transport from home to health institutions
  - Free transport between facilities in case of referral
  - Free drop back from Institutions to home after 48hrs stay

LaQshya 00:25:09

- 'Q' denotes quality of care

Ministry of Health and Family Welfare
Government of India
LAQSHYA
The National Labour Room Quality Improvement Initiative
LAQSHYA
लक्ष्य

Fig: 8

- **Objectives**

  - To improve quality of care for pregnant women in **labor rooms, maternity operation theatres, obstetrics intensive care units** (ICUs) & **high dependency units** (HDUs)
- **National Quality Assurance Standard**
  - Minimum 70% quality assurance is maintained in every hospital
  - Every hospital meeting >70% (silver), >80% (Gold) or >90% (platinum) quality assurance is given badges
  - There is a mobile app showing guidelines to HCWs to be followed

Navjaat Shishu Suraksha Karyakram 00:26:45

- "Navjaat" – New born
- NSSK is a programme aimed to train health personnel in basic newborn care and resuscitation, has been launched to address care at birth issues i.e., Prevention of Hypothermia, Prevention of Infection, Early initiation of Breast feeding and Basic Newborn Resuscitation.
- Objective
  - New born care and resuscitation (So a person who is well trained in neonatal care is to be hired)

DOC TUTORIALS LOGIN FOR SUCCESS

Fig: 9

MAA- Mother's Absolute Affection 00:29:37

MAA
Mothers' Absolute Affection
एक संकल्प

Fig: 10

- MAA (Mothers' Absolute Affection) Programme Promotion of Breastfeeding and IYCF (Infant & young Child Feeding)

TUTORIALS LOGIN FOR SUCCESS

Mission Indradhanush 00:31:20

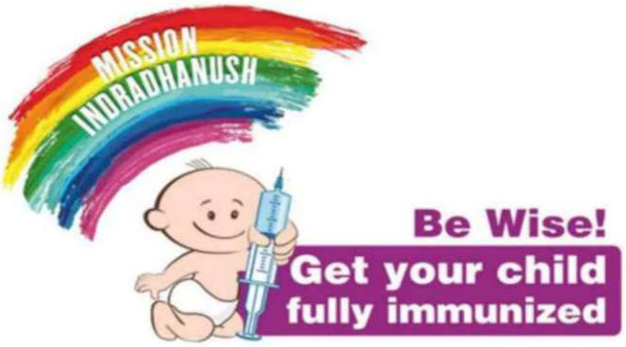

MISSION INDRADHANUSH
Be Wise!
Get your child fully immunized

Fig: 11

- Objective
  - To immunize all children **under 5 years against 7 vaccine preventable diseases**

Intensified Mission Indradhanush 2.0 00:31:45

- Give minimum 90% immunization to children < 2 years of age and pregnant women
- Vaccines for 8 preventable diseases:
  - Tuberculosis
  - Meningitis and pneumonia
  - Measles
  - Hepatitis B
  - Tetanus
  - Whooping Cough
  - Poliomyelitis
  - Diphtheria

TUTORIALS LOGIN FOR SUCCESS

Rastriya Bal Swasthya Karyakram (RBSK)

00:33:56

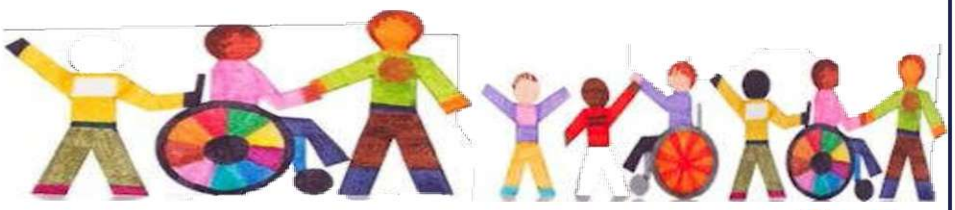


Fig: 12

- Rashtriya Bal Swasthya Karyakram (RBSK) is an important initiative aiming at early identification and early intervention for children from birth to 18 years to cover 4 'D's viz. Defects at birth, Deficiencies, Diseases, Development delays including disability.
  - Deworming biannually → Feb 10th August 10th
  - All children from **0-18 years**
  - Child health screening & early intervention services
- Objective-
  - For early detection or screening & management of the **4Ds** prevalent in children
    i. Defects at Birth
    ii. Disease in children
    iii. Deficiency Conditions
    iv. Developmental delays including disabilities

AmarTafreeh.com

WE ARE ALL
WONDERFULLY MADE

Fig: 13

Rashtriya Kishor Swasthya Karyakram

00:36:13

- National Adolescent Health Program: In order to ensure holistic development of adolescent population, the Ministry of Health and Family Welfare launched Rashtriya Kishor Swasthya Karyakram (RKSK) on 7th January 2014 to reach out to 253 million adolescents

i. Improve nutrition
ii. Enhance Mental Health
iii. Improve sexual and Reproductive Health
iv. Prevent injuries and violence
v. Prevent substance misuse

Ujjwala

00:38:05

STOP
Violence Against Women

Fig: 14

- STOP violence against women
- Under Ministry of Women and Child development
- Prevention of trafficking
- Rescue
- Rehabilitation
- Re-integration of victims

Nirmal Bharat Abhiyan 00:39:44

NIRMAL
BHARAT
total sanitation for all

Fig: 15

निर्मल
भारत यात्रा
NIRMAL BHARAT YATRA

Fig: 16

- Objectives
  - Total sanitation campaign
  - To eradicate the practice of open defecation by **2022**
  - Jahan Soch Waha Souchalay

Swacch Bharat Abhiyan 00:41:22

CLEAN MY INDIA
SWACHH HINDUSTAN

Fig: 17

- Prime Minister Shri Narendra Modi Launched the ambitious 'Swachh Bharat Abhiyan' (Clean India Mission) 2nd October 2014The 'Abhiyan' was launched on the ocassion of Mahatama Gandhi's 145th birth anniversary
- Objective
  - To clean streets, roads, and infrastructure of the country

Kayakalp Awards 00:41:55

- A national initiative launched by Ministry of Health and Family Welfare (MoHFW) under Swachh Bharat Abhiyan to promote cleanliness and enhance the quality of healthcare facilities in India.
- Under the Kayakalp initiative, the government gives awards to those public health care facilities that exhibit high levels of hygiene, cleanliness and infection control.
- Objective-
  - To promote cleanliness, hygiene and infection control practices in Public Health care facilities
  - Whichever hospital wins, gets 50L incentive

TUTORIALS LOGIN FOR SUCCESS

Swach Survekshan 00:43:09

- Swachh Survekshan is an annual survey of cleanliness, hygiene and sanitation in cities and towns across India. It was launched as part of the Swachh Bharat Abhiyaan
- Gives awards to the cleanest city in the country
- In 2020- Indore won the first place as the cleanest city in India

Nasha mukti Abhiyan 00:43:58

- Drug Free India Campaign
- Under Ministry of Social justice and Empowerment
- International Day Against Drug Abuse and Illegal Trafficking → **June 26th**
- Better knowledge for better care

Nirbhaya Scheme 00:45:00

- Under Ministry of Women and Child development
- Ensure safety of women

Swasthya Nagrik Abhiyan 00:45:25

- Social movement for health
- Create awareness among citizens regarding;
  - i. Cleanliness and sanitation
  - ii. Healthy diets

iii. Freedom from tobacco and alcohol

iv. Road safety

v. Stress management

vi. Air Pollution

vii. Gender violence

Rashtriya Swasthya Beema yojna (RSBY)

00:46:46

DOC TUTORIALS
LOGIN FOR SUCCESS

राष्ट्रीय स्वास्थ्य बीमा योजना
Rashtriya Swasthya Bima Yojana (RSBY)

Fig: 18

राष्ट्रीय स्वास्थ्य बीमा योजना
Rashtriya Swasthya Bima Yojana
Issued:Jan.2008
XXXX(Vernacular)
XXXX (English)
AGE: 42 yrs.
GENDER: MALE
0000 1651 0700 0012 6

Fig: 19

- Nationwide insurance scheme
- An individual pays 30 rupees/ year and gets an insurance coverage of Rs. 30,000 per year
- Only available for a family of 5 members

- Works using a **smart card**

Ayushman Bharat 00:50:41

Ayushman Bharat: A National Health Protection Mission
राष्ट्रीय स्वास्थ्य बीमा योजना
आयुष्मान भारत योजना
2018
National Health Protection Mission

Fig: 20

- A.k.a **National health protection mission** (or) **Pradhan mantra Jana arogya yojana (PMJAY)**
- Cashless hospitalisation **(upto 5 lakh/year)**
- PMJAY e-card
- Coverage of **Rs.5 Lakh per family per annum** for secondary and tertiary care across public and private hospitals
- Covers upto **3 days pre-hospitalisation** & upto **15 days of post-hospitalisation expenses**
- No restriction on the family size, gender or age.

MOSQUITO CONTROL MEASURES

Integrated Vector Central Approach

- Integrated Vector Management is a decision-making process for the management of vector populations, so as to reduce or interrupt transmission of vector-borne diseases.
- An IVM approach takes into account the available health infrastructure and resources and integrates all available and effective measures, whether chemical, biological, or environmental.

i. Anti-larval agents.
ii. Killing adults (anti-adult).
iii. Personal protection.

Anti-Larval measures 00:01:40

Fig: 1

- Stagnant water (Mosquito breeding site)→ lay eggs → larvae->Pupa ->Adult.

- Environmental modification/source reduction & Manipulation, Changes to human habitation or behaviour.
- Aedes – get rid of artificial source of water.
- Anopheles-get rid of artificial clean water collection (sink overhead water tank etc.).
- Culex – get rid of polluted water.
- Mansonia – get rid of water with aquatic plant.

Chemical Control 00:04:30

- mineral oils and films
- Paris green – larval stomach poison→Kill larvae that feed on surfaces mainly for anopheles.
- Synthetic insecticides – abate toxic to larva (a.k.a temephos).
- Malathion.

TUTORIALS LOGIN FOR SUCCESS

Biological Control 00:06:22

- fresh water Gambusia affinis
- common guppy (Poecilia reticulata) or lebistes reticulatus.
- bacterium Bacillus thuringiensis.
- 46 → toxorhynchites splendens → predator mosquito that feeds on larvae.

Anti-Adult Measures 00:08:24

i. Indoor Residual Sprays → Residual spray (to kill the mosquitos that rest on the indoor wall.) **It has residual effect.**

Its effect lasts for long time example: DDT, BHC, malathion

ii. Space spray – It is the dispersal of a liquid fog of insecticide into an outdoor area to kill adult insects. eg: pyrethrum extract.

Fig: 2

ii. GENETIC CONTROL

- Sterile male technique.
- Cytoplasmic incompatibility.
- Chromosomal translocation.
- Sex distortion.
- Gene replacement.

Fig: 3

- Pyrethrum is obtained from chrysanthemum.
- Nerve poison – knocks down mosquitos by causing paralysis.

Pyrethrum has active pyrethrin 00:13:20

TUTORIALS LOGIN FOR SUCCESS

- Active principles.
  - Pyrethrin 1
  - Pyrethrin 2
  - Cinerin 1
  - Cinerin 2
  - Jasmoline 1& 2

Synthetic Pyrethroids

- Permethrin
- Alletherin
- Flumethrin

- Cyfluthrin
- Deltamethrin

Personal Protection Measures 00:15:26

- Mosquito nets.
- Mosquito screens.
- Repellants.

i. Mosquito nets:

- No of holes per square inch → 150
- Size of each hole diameter → < 0.0475 inch.

ii. Mosquito screens:

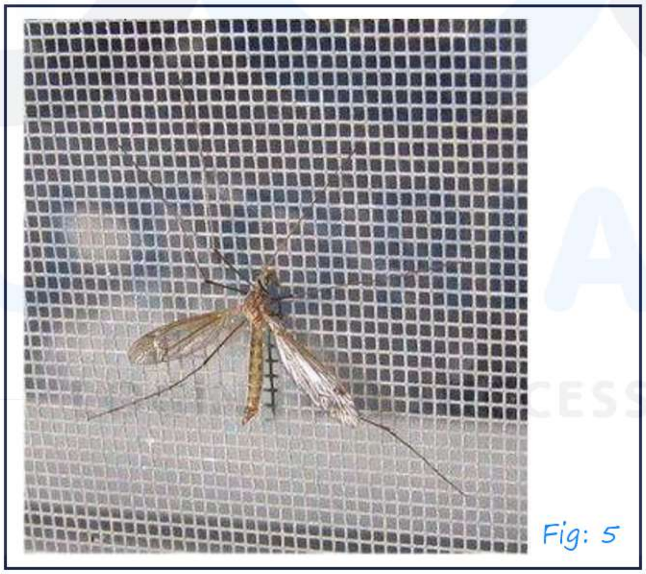


Fig: 5

- Aperture size should be < 0.0475 inch.

iii. Mosquito Repellants

Good knight naturals
Mosquito Repellent Cream
Good knight
ADVANCED
ACTIV+CARTRIDGE

Fig: 6

TUTORIALS
LOOK FOR SUCCESS

- Contain synthetic pyrethroids.
- N, N-diethyl-meta-toluamide (DEET), ethyl hexanediol are present in local application cream.

TREATED NETS

Fig: 7

- (ITBN) Insecticidal Treated Bet Nets → contain synthetic pyrethroids.
- Retreat → every 6th month.
- (LLITBN) Long lasting Insecticidal treated bet nets→ → retreated every 3years.

Yellow Fever 00:19:53

- Vector → aedes mosquito.
- Airports and seaports have to be kept free from the breeding insect vectors for a distance of 400m.
- "Aedes Aegypti index" – It is the ratio expressed as percentage of the number of houses in a well-defined limited area in surrounding of which breeding places of Aedes aegypti has been identified to the total number of houses surveyed in that area.
  It should not be more than 1%.
- A traveler without a "valid international certificate of vaccination" is placed on quarantine for 6 days.
- Validity of vaccination certificate begins 10 day after vaccination and extends up to lifetime.

TUTORIALS LOGIN FOR SUCCESS

Vector Survey 00:22:00

- **3 indices are**

i. Container index

$$\frac{\text{No of positive containers}}{\text{No of containers inspected}} \times 100$$

ii. House index:

$$\frac{\text{No of houses with larvae}}{\text{No of houses inspected}} \times 100$$

iii. Breteau index: no of water holding containers infected with aedes larvae per houses inspected.

$$\frac{\text{No of positive containers}}{\text{No of houses inspected}} \times 100$$

Index	**Low risk**	**High risk**
Container index	< %	>10%
House index	<1%	>10%
Breteau index	<5%	>50%

PROBLEM VILLAGE AND WATER REQUIREMENT

i. Water scarcity

ii. Water pollution

Water scarcity 00:00:52

- What is a **problem village**? A village where:

  1.No safe water within a distance of 1.6kms.

  2.Water not available till a depth ≤15 meters.

  3.Water has excess salinity, iron, fluorides and toxic materials.

  4.Exposed to the risk of cholera or guinea worm.

Per capita consumption of water 00:02:42

- Daily drinking water requirement – **2-3L Per capita/day.**
- **As per the results of a large scale survey conducted across India in 2020, teens of 19 years and below drank about 1.98 liters of water on average every day in the country.**
- Urban area – **150 – 200L Per capita/day** (recommended)
- Rural area – **40 – 60L Per capita/day**
  - What is a "safe yield of water"? → It is the amount of water that can be withdrawn from the aquifer system without producing an undesired effect.
- If water is available for more than 95% of the year.

WATER PURIFICATION METHODS

- Small scale. Slow sand filter
- Large scale Rapid sand filter

Slow sand filter 00:02:37

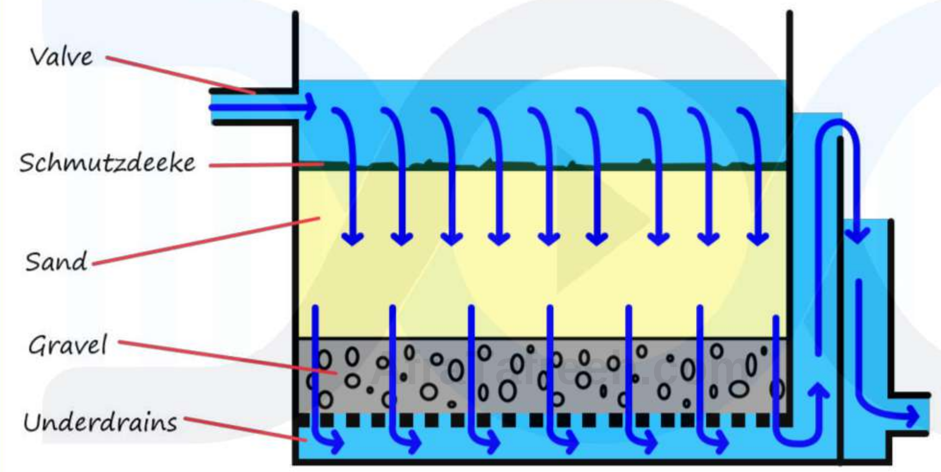


Fig: 1

DOC TUTORIALS LOGIN FOR SUCCESS

- Slow sand filter has a layer of algae called **schmutzdecke** layer/vital layer/zoogleal layer which removes **99.9%** bacteria from water.
- Rest of the layer resemble layers of *earth's soil.*
- When vital layer becomes too thick some of it is scraped out.

Rapid sand filter 00:04:07

- In rapid sand filter water which is treated by alum is passed through the filter, so alum floccules get lodged in the filter on daily basis.
- To remove these floccules a technique called **backwash** is employed in which water is passed backwards through the filter.

Back wash

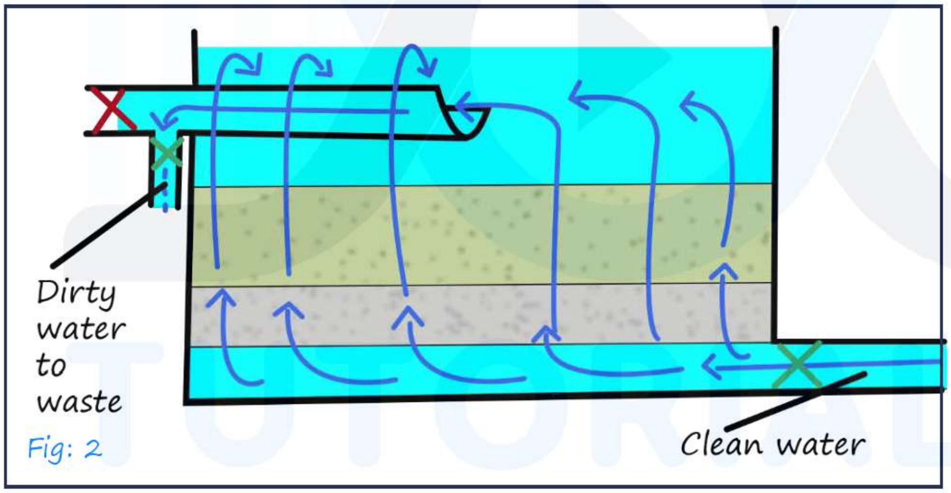


Fig: 2

- There is no vital layer in rapid sand filter
- Rate of filtration is almost 40 times more when compared to slow sand filter
- In rapid sand filter sand size is 0.4-7mm whereas in slow sand filter sand size is 0.2-0.3mm
- In rapid sand filter loss of head is 6-8 it and in slow sand filter loss of head is 4 feet

- Loss of head is something that tells us about the bed resistance which in turn tells us if the filter is working properly
- Bed resistance is measured using **venturimeter**

Slow	**Rapid**
Sand size-0.2 – 0.3mm	0.4 – 7mm
Water without treatment	Water after treatment with alum
Slow filtration	Rapid filtration (40 times)
Algae, plankton → vital layer formed	Not formed
Loss of head – 4ft	Loss of head → 6-8 ft
Method of cleaning-scraping sand bed	Daily backwashing as Clogging occurs due to alum floccules
Less skilled personnel required	Highly skilled
99.9% purification	80-90% purification
Construction -simple	complicated
Also called biological filter	2 types gravity and pressure type

Chlorination 00:07:40

- Small scale purification methods include
  i. Boiling, Distillation, Filtration through muslin cloth, Three pitcher system
  ii. Chemical treatment (Example -chlorine).
  iii. Domestic filters e.g. Berkefeld filter and Pasteur's Chamber- land filter
  iv. (RO) reverse osmosis filtration.
- Chlorine in the form of bleaching powder is used to chemically treat water.
- Bleaching powder when put in water dissociated into hypochlorous acid and hypochlorite ion.
- Hypochlorous acid has major action in purifying water.
- PH of water for chlorination → 7
- Contact period of **free residual chlorine is 1 hour.**
- Chlorination does not kill spores, cysts and viruses like hepatitis A and polio.

TUTORIALS LOGIN FOR SUCCESS

Levels of (FRC) free residual chlorine recommended 00:09:37

- **If chlorine is selected as the disinfectant, it will be added to the water in a way that its residue remains in the line so as to prevent any unpredicted pollution.**

- **The term free residual chlorine (FRC) is given to each one of the ($HClO$), ($OCl-$), $Cl-$ (g) compounds.**

Water type	Residual chlorine level
Drinking water	> 0.5mg/liter (ppm)
Water bodies, post disaster	> 0.7mg/liter (ppm)
Swimming pool sanitation	> 1.0mg/liter (ppm)

Instruments used in chlorination 00:11:25

Horrock's apparatus: used for estimating the dose of bleaching powder needed to disinfect water.

i. Contents –

- 6 white cups (200ml capacity).
- 1 black cup (with circular mark inside).
- 2 metal spoons → (each spoon holds 2gm of bleaching powder).
- One pipette.
- 7 days stirring rods
- Indicator: **starch iodide.**

ii. Method –

- Add 1 spoonful (2g) of bleaching powder in the black cup and fill it with water till the level of circular mark and stir this is called stock solution.

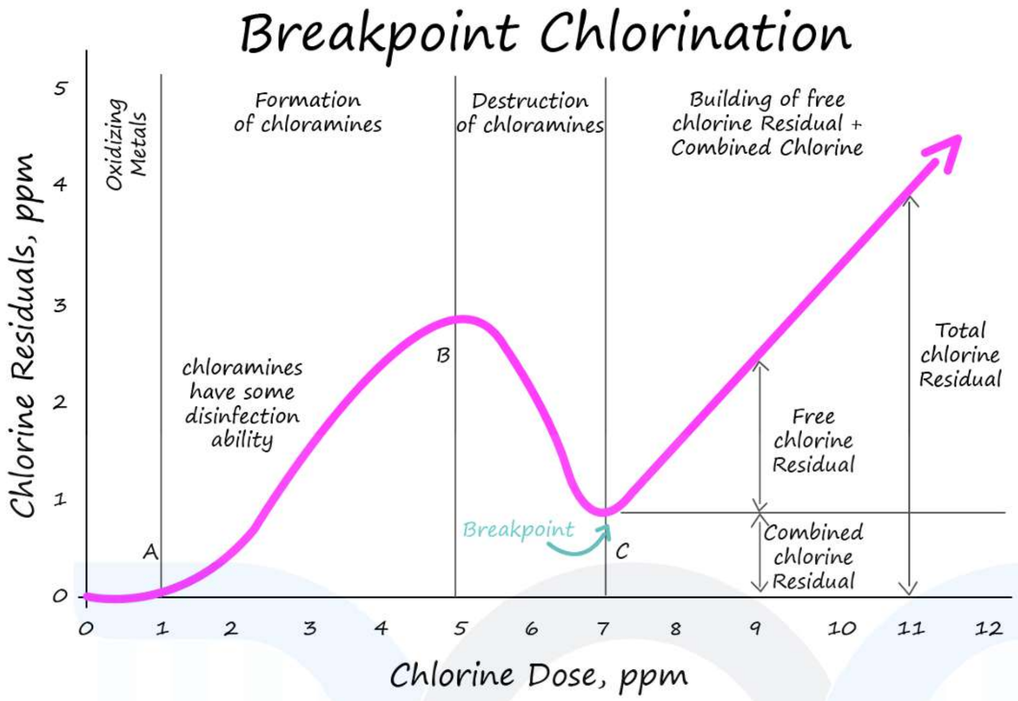
- Fill the 6 white cups with water to be purified then using pipette add stock solution in a manner such that 1st cup gets 1drop, 2nd cup 2drops and so on. stir each glass with glass rods.
- Then add starch iodide 3 drops in each of the 6 white cups.
- Observe for **blue color. (Development of blue color indicates the presence of free residual chlorine.)**

iii. Formula –

- If n^{th} cup shows blue color first then, **nx 2gm of bleaching powder is needed to purify 455 liters of some water.**

Phases of chlorination 00:17:03

- Phase I → chlorine combines with nitrogen containing compounds forming chloramines.
- Phase II → destruction of chloramines.
- Phase III → appearance of breakpoint.
- Phase IV → accumulation of free residual chlorine.



Breakpoint Chlorination

Combined Chlorine = Total Chlorine – Free Available Chlorine

Tests for chlorine content 00:19:45

- Ortho – toluidine test (OT test).
- Ortho – toluidine arsenite test (OTA test).
  - OT test = **combined chlorine and free residual chlorine** is present together in water.
  - OTA = individual percentages of free and combined chlorine in water can be known
  - **Chloroscope** is a device which helps to estimate percentage of chlorine by comparing and matching test color with grades of yellow color in chloroscope.
  - Quickest and simplest method for FRC estimation.

- **N-N Diethyl -p-phenylenediamine indicator test** → a capsule is put in water which turns it different shades of red which is used to estimate chlorine (FRC) through colorimetric analysis

Hardness of water 00:22:24

The term hardness was originally applied to waters that were hard to wash in, referring to the soap wasting properties of hard water.

i. Temporary hardness – due to Ca &Mg bicarbonates → aka Carbonate hardness

ii. Permanent hardness – due to Ca & Mg sulphates, chlorides, nitrates → aka Non Carbonate hardness

- 1meq/L = 50ppm = 50mg/L
  - < 1meq/L → soft water
  - 1-3 → moderately hard water.
  - 3-6 meq/L → hard
  - > 6 meq/L → very hard.
- Moderately hard water is recommended for drinking purposes.
- Soft water is not recommended because it has been seen to cause some cardiovascular diseases.

SEWAGE AND DISEASE – CAUSED BY WATER

Sullage	Sewage
Human Excreta is absent	Excreta is present
Kitchen, bathroom water	human wastes (i.e. faeces and urine), as well as wastewater from various sources
a. k. a Grey water	a. k. a Black water

White water
- Drinking water

Strength of sewage is measured by 00:02:40

i. Biological oxygen demand (BOD)
ii. Chemical oxygen demand (COD)
iii. Suspended solids

BOD: The amount of dissolved oxygen (DO) consumed by biological organisms when they decompose organic matter in water

- Oxygen required by the biological organism present in the sewage for **aerobic decomposition** of organic matter
- Assessed in the span of **5 days**
- As BOD Increases → Pollution of sewage Increases

2 methods to asses BOD

Fig: 1

1. Dilution Method

Diluted method

↓

Premeasured quantity of oxygen is dissolved closed in a tight amber colored bottle with a lid

↓

Lid contains digital reading at the end of 5 days **O_2 content is noted**

2. Manometric method

- Strong sewage → >300mg/L
- Weak sewage → <100mg/L

COD: The amount of oxygen consumed when the water sample is chemically oxidised.

- Chemical oxygen demand
- Same principle as BOD but **chemical oxidizer** is used to assess the oxygen consumed.
- **Potassium dichromate** is the chemical used to asses' COD

Suspended Solids

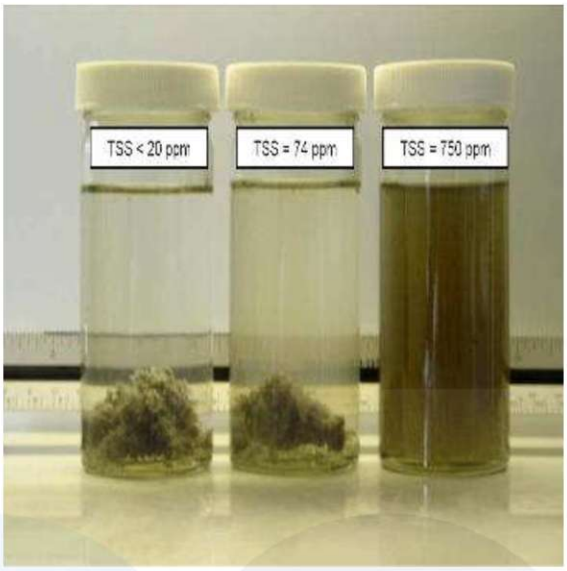


Fig: 2

- Interpretation
- Strong sewage → >500mg/L
- Weak sewage → <100mg/L

Diseases caused by water 00:09:54

1. **Water borne Diseases** → (spread when people drink contaminated water, or eat food that has been prepared with contaminated water) Polluted water inside body (Hep A, Typhoid, Cholera etc.)
2. **Water washed diseases** →(caused by lack of clean water for washing) Outer surface contract with polluted water (Scabies trachoma conjunctivitis etc.)
3. **Water based diseases** → (spread by organisms that develop in water by intermediate hosts and then become human parasites by skin penetration,

ingestion). Aquatic organisms (Dracunculiasis, Schistosomiasis etc.)

4. **Water related diseases** →(spread by insects which form habitats on stagnant water sources.) a. k. a water breeding disease (Malaria, Filariasis, Dengue etc.)

INDICATORS OF FECAL POLLUTION OF WATER

Bacterial indicators 00:00:36

i. Primary

- Coliforms (E. coli): bacteria commonly found in human feces

ii. Supplementary (Non-Coliform bacteria)

- Fecal Streptococci- indicate **recent** contamination with fecal matter
- Spores of Clostridium perfringens- indicate **remote** contamination

Chemical indicators 00:03:09

i. Nitrate- indicative of remote contamination

ii. Nitrite- indicates recent contamination

TUTORIALS LOGIN FOR SUCCESS

Tests to detect fecal contamination 00:05:00

i. MPN (Multiple tube test)

- A series of tubes containing a suitable selective broth culture medium is inoculated with test portions of a water sample.
- To check for presence of coliforms
- Number of tubes – **15**
- **Macconkey's lactose bile salt broth** is used
- Indicator – **Bromocresol purple**

– Look for – **Fermentation** by detecting a **column of gas** in test tube

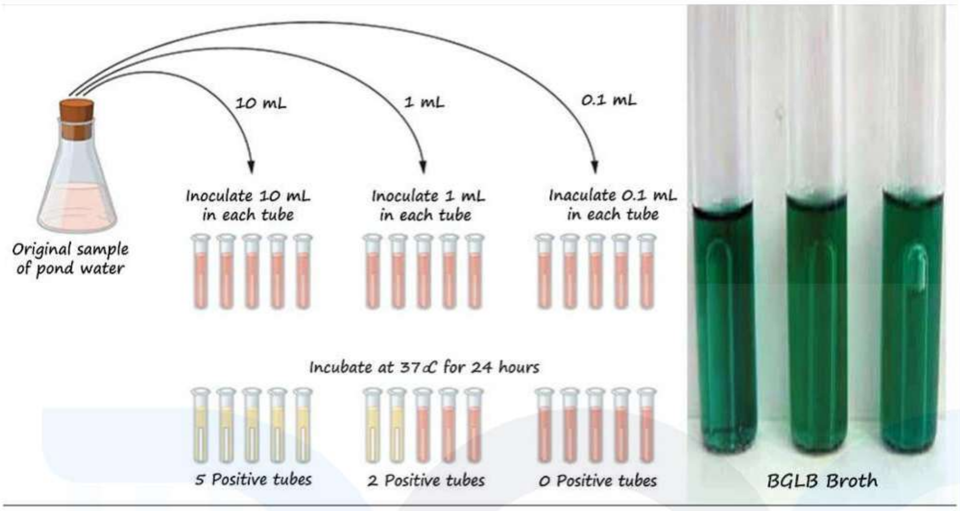

10 mL
1 mL
0.1 mL
Original sample of pond water
Inoculate 10 mL in each tube
Inoculate 1 mL in each tube
Inaculate 0.1 mL in each tube
Incubate at 37°C for 24 hours
5 Positive tubes
2 Positive tubes
0 Positive tubes
BGLB Broth

Fig: 1

Fig: 2

ii. Eijkman's test: or Differential coliform test or Confirmed Escherichia coli count

iii. Test used for the identification of coliform bacteria from warm-blooded animals based on the bacteria's ability to produce gas when grown in glucose media at 46°

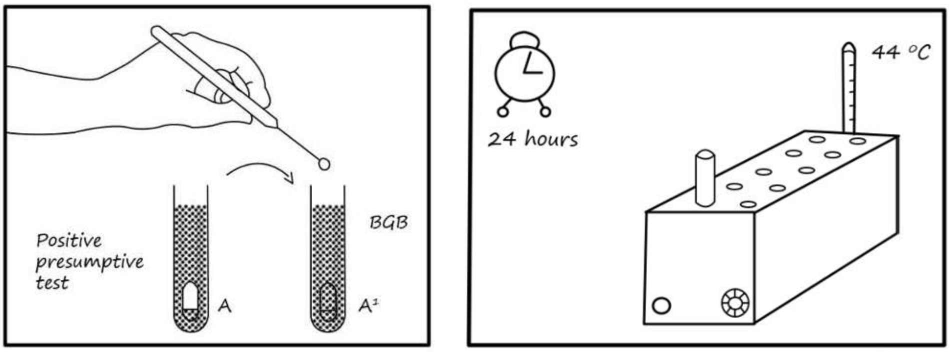


Fig: 3

- It is a confirmatory test

Eutrophication 00:08:32

- Excessive growth of water plants & algae on surface of water bodies contaminated with nitrogen compounds
- Eutrophication also cuts oxygen supply to living organisms in the water body
- It occurs naturally over centuries as lakes age and are filled in with sediments.
- However, human activities have accelerated the rate and extent of eutrophication through both point-source discharges and non-point loadings of limiting nutrients, such as nitrogen and phosphorus, into aquatic ecosystems (i.e., cultural eutrophication), with dramatic consequences for drinking water sources, fisheries, and recreational water bodies

DOC TUTORIALS
LOGIN FOR SUCCESS

INDICATORS OF AIR POLLUTION

Air Pollutants 00:02:01

- Airborne substances (either solids, liquids, or gases) that occur in concentrations high enough to threaten the health of people and animals, to harm vegetation and structures, or to toxify a given environment.
- Pollutants with the strongest evidence for public health concern include particulate matter (pm), carbon monoxide (co), ozone (o3), nitrogen dioxide (no2) and sulphur dioxide (so2).
- Particulate matter (pm) refers to inhalable particles, composed of sulphate, nitrates, ammonia, sodium chloride, black carbon, mineral dust or water.

Air pollutants

Primary pollutants

SO_2, NO_2, CO

Secondary pollutants

- Ground level ozone
- Peroxy acetyl nitrate
- Smog
- Acid rain

Fig: 1

GIRL STABBED WITH STILETTO IN FOG
FOURTH NIGHT OF FOG CHAOS IN LONDON

Fig: 2

Air pollutants can be:

a. Indoor

b. Outdoor

Fig: 3

Indoor Air Pollutants 00:03:45

- MaROON SCARF (Mnemonic for Indoor air pollutants)
  - M – Mineral fibres
  - R – Respirable particles

  - O – Ozone
  - O – Organic vapours
  - N – Nitrogen dioxide
  - S – Sulphur dioxide
  - C – CO, CO_2
  - A – Asbestos
  - R – Radon
  - F – Formaldehyde

- Few other indoor air pollutants:
  - Particulate matter
  - Carbon monoxide
  - Secondhand tobacco smoke
  - Pesticides
  - Solvents
  - Volatile organic compounds
  - Biological pollutants: Mites, Allergens, Moulds
  - Built environment
  - Radon
  - Asbestos
  - Occupation-related contaminants

Chemical indicators of air pollution 00:04:35

i. Sulphur dioxide (Best indicator of air pollution)

ii. Smoking/soiling index: measure of the soiling properties of total suspended particulates in air determined by drawing a measured volume of air through a known area of Whatman No. 4 filter paper for a measured period of time, expressed as COHs/1,000 linear feet

iii. Grit and dust measurement

iv. Coefficient of haze: also known as smoke shade, is a measurement of visibility interference in the atmosphere

v. Air pollution index: calculated based on average concentration of air pollutants namely SO2, NO2, CO, O3, PM2.5 and PM10.

Best biological indicators of air pollution → Lichens

INSTRUMENTS FOR MEASURING AIR POLLUTION

Measuring Air temperature 00:00:34

- Various thermometers are used to measure air temperature–

  i. Dry bulb thermometer

  ii. Wet bulb thermometer

  iii. Maximum thermometer

  iv. Minimum thermometer

  v. Six's maximum and minimum thermometer

  vi. Silvered thermometer

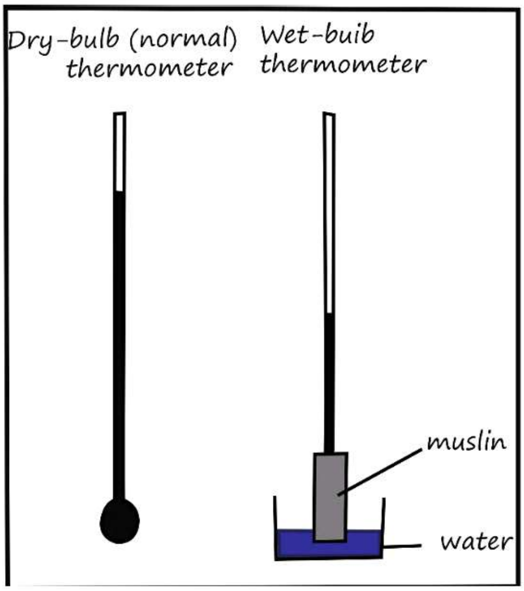

Dry-bulb (normal) thermometer
Wet-buib thermometer
muslin
water

Fig: 1

- Globe thermometer – It measures **mean radiant temperature.**

Fig: 2

- Indices of Thermal comfort:

  1.Air temperature

  2.Air temperature & Humidity

  3.Cooling Power

  4.Effective temperature: It is an arbitrary index which combines into a single value the effect of temperature, humidity and movement of the internal air on the sensation of warmth or cold felt by the human body.

  5.Corrected effective temperature: It is an improvement over the Effective Temperature Index. Instead of the dry bulb temperature, the reading of the Globe Thermometer is used to allow for radiant heat. That is, the C.E.T. scales deal with all the four factors namely, air temperature, velocity, humidity and mean radiant heat.

- Kata thermometer – Measures **cooling power of air**

Fig: 3

- Factors that determine the cooling power of air -
  i. Temperature
  ii. Humidity
  iii. Air movement
- Indicators of thermal comfort: devised by Hill called kata thermometer to measure cooling power of air-
  i. Dry Kata reading more than > 6
  ii. wet Kata reading more than > **20**
- Kata thermometer is also used for measuring **low air velocity.**

Hygrometer 00:05:19

- Hygrometer - Used to **measure humidity**.

40
60
20
80
0
100
%
Hygrometer
0
10
20
30
40
50
60
70
80
90
100
% rel.
HYGROMETER

Fig: 4

- Sling psychrometer – It measures **relative humidity**.

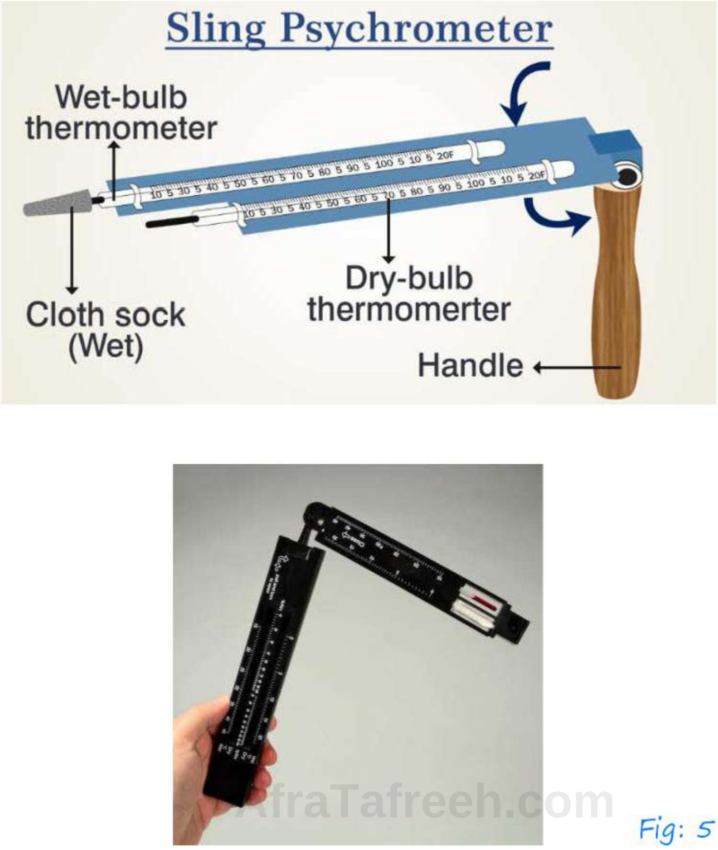

Sling Psychrometer
Wet-bulb thermometer
Cloth sock (Wet)
Dry-bulb thermomerter
Handle

Fig: 5

- Anemometer – It measures **air velocity**.

Fig: 6

- Cup anemometer

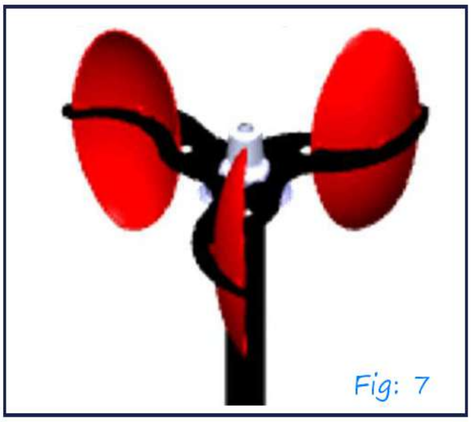


Fig: 7

- Wind vane – To know the direction of wind.

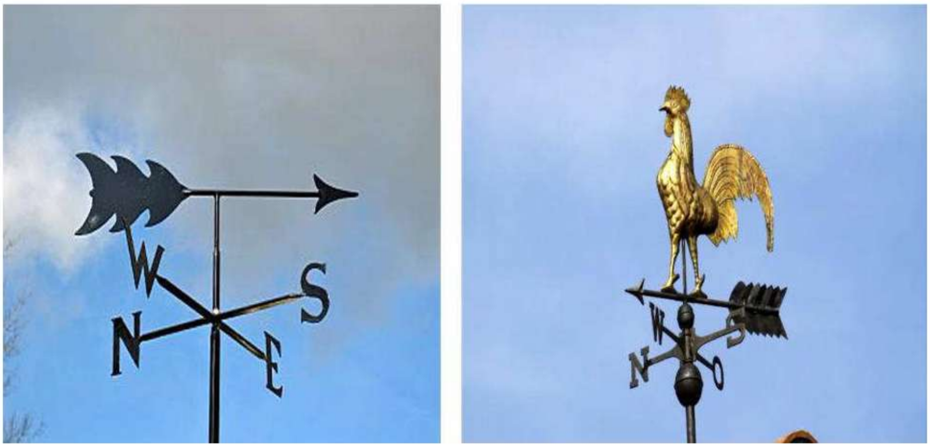


Fig: 8

- Rain gauge - To measure **rain**

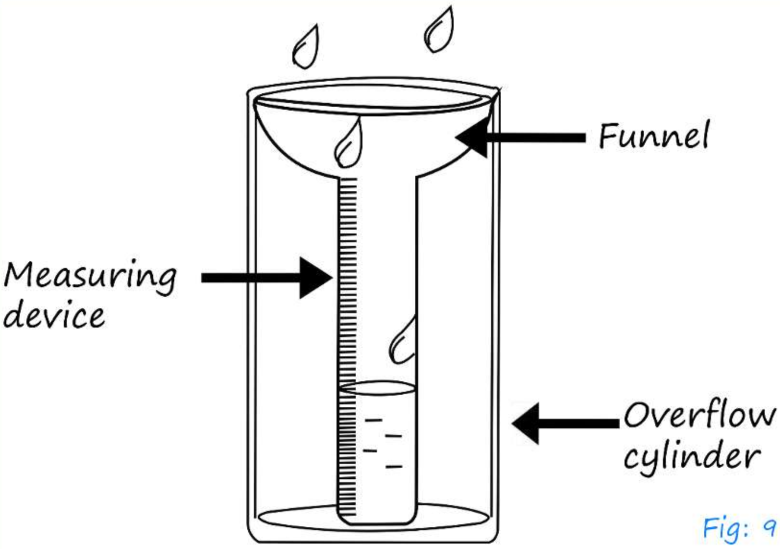

Funnel
Measuring device
Overflow cylinder

Fig: 9

- Commercial rain gauge

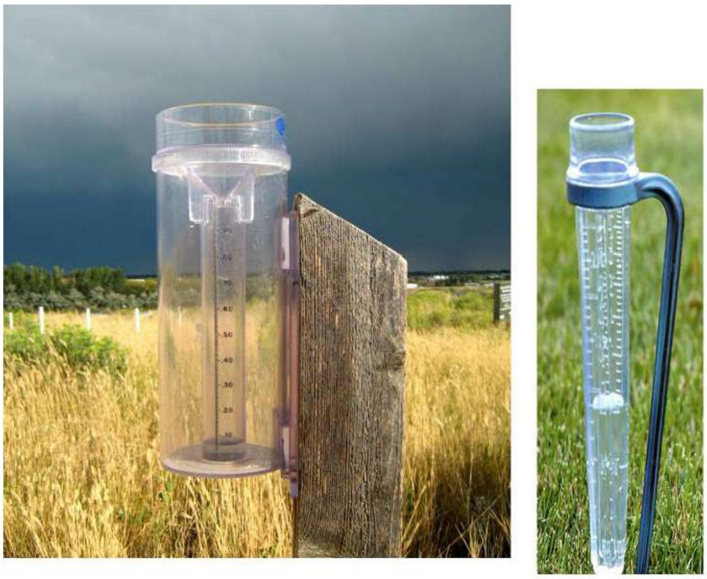


Fig: 10

TYPES OF VENTILATION AND MCQS

Ventilation is of two types: 00:00:17

Ventilation

Natural	Artificial
i. Wind	i. Exhaust ventilation
ii. Diffusion	ii. Plenum ventilation
iii. Perflation	iii. Balanced ventilation
iv. Aspiration	iv. Air conditioning

Artificial ventilation: 00:01:30

i. Exhaust

- Here, there is an exhaust fan and bad air from inside is drawn out using electricity.

Exhaust

Fig: 1

ii. Plenum

- Here, there are holes on the ceiling through which, the fresh air is pushed into spaces to be ventilated from a chamber (Plenum chamber) at a pressure slightly higher than atmospheric pressure so as to expel foul air

Plenum

Plenum ceiling

Fig: 2

iii. Balanced

- Balance of exhaust + Plenum

iv. Air conditioning

- Here, multiple factors like air temperature, humidity, air movement are controlled simultaneously.

Standards of ventilation 00:02:47

- **2 to 3 air changes** per hour in living room is recommended
- **4 to 6 air changes** per hour in work rooms is recommended
- Most common Ardle's index is also known as "predicted 4hr sweat rate"
- Most common Ardle's maximum allowable sweat rate: **4.5L/4 hours under sun**

- Comfort zones may be defined as the range of ETs over which the majority of adults feel comfortable.
- McARDLE'S MAXIMUM ALLOWABLE SWEAT RATE: McArdle and associates took 4 .5 litres of sweat excreted in four hours as the maximum allowable sweat rate compatible with physiological normal reaction of acclimatized, healthy young men for repeated exposures to heat
- McArdle has put P4SR (predicted 4 hours sweat rate) value of 3 as upper limit of comfort zone

Zone of comfort	P4SR (predictable 4 hour sweat rate)
Comfort zone	Up to 3
Just tolerable	3 to 4.5
Intolerable	> 4.5

Cross ventilation (also called Wind Effect Ventilation)

- It is a natural method of cooling. The system relies on wind to force cool exterior air into the building through an inlet (like a wall louver, a gable, or an open window) while outlet forces warm interior air outside (through a roof vent or higher window opening)

EFFECTS OF AIR POLLUTION

I. Global warming 00:00:23

i. Increase in greenhouse gases.

ii. Creates holes in the ozone layer.

iii. A greenhouse gas is any gaseous compound in the atmosphere that is capable of absorbing infrared radiation, thereby trapping and holding heat in the atmosphere

iv. By increasing the heat in the atmosphere, greenhouse gases are responsible for the greenhouse effect, which ultimately leads to global warming.

v. Greenhouse gases are:

   i. Water vapor.
   ii. Carbon dioxide.
   iii. Methane.
   iv. Nitrous oxide.
   v. Ozone.
   vi. Chlorofluorocarbons.
   vii. Hydrofluorocarbons.

Agreements at the International level: 00:02:00

i. Kyoto protocol

- Signed in Kyoto Japan.

- Objective was to reduce greenhouse gases emission collectively by 5.2% compared to the level in 1990.
- covers six categories of greenhouse gas (GHG) emissions: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphurhexafluoride (SF_6).

ii. Montreal protocol and Vienna convention

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
THE MONTREAL PROTOCOL
OVER 30 YEARS OF HEALING OUR OZONE TOGETHER!

Fig: 1

- Objective – To protect ozone layer and replenish it.
- 1987 Montreal Protocol on Substances that Deplete the Ozone Layer is a landmark agreement that has successfully reduced the global production, consumption, and emissions of ozone-depleting substances (ODSs).
- ODSs are also greenhouse gases that contribute to the radiative forcing of climate change

iii. Paris agreement

PARIS AGREEMENT
UNITED NATIONS
PARIS CLIMATE AGREEMENT
SIGNING CEREMONY
22 APRIL 2016

Fig: 2

- To fight against the climate change.
- To reduce global temperature.

II.Global dimming 00:06:40

- Decrease in temperature due to **aerosol** (produced as a byproduct of burning fossil fuels.) which blocks out the heat waves (opposite of Global Warming)
- Usually seen in developing countries.
- Global dimming interacts with global warming by blocking sunlight that would otherwise cause

evaporation and the particulates bind to water droplets.

- Water vapor is the major greenhouse gas. On the other hand, global dimming is affected by evaporation and rain. Rain has the effect of clearing out polluted skies.

NOISE POLLUTION

Noise pollution: 00:00:17

- Noise is unwanted sound at wrong place at wrong time.
- Noise has two important properties:
- loudness or intensity; and frequency.

i. Human ear is sensitive to sound frequency of **20Hz - 20,000Hz**

ii. Normal conversation → **60-70 dB**

iii. Whispering → **20-30 dB**

iv. Auditory fatigue occurs around **90 dB**

v. Mechanical damage or rupture of the tympanic membrane occurs at **150-160 dB**

VECTORS OF PUBLIC HEALTH IMPORTANCE

- A vector is a living organism that transmits an infectious agent from an infected animal to a human or another animal.
- Vectors are frequently arthropods, such as mosquitoes, ticks, flies, fleas and lice.

Arthropods are mainly divided into three classes:

i. Class Insecta (3 pairs of legs)
ii. Class Arachnida (4 pairs of legs)
iii. Class crustacea **(5 pairs of leg)**

Class Insecta Is Divided In To 5 Sub Classes

i. Mosquito
ii. Flies
iii. Flea
iv. Lice
v. Bugs

Under class arachnida there are:

- Ticks
- Mites

Under class crustacea there are:

- Cyclops

FLIES: 00:05:28

I. Sand-fly

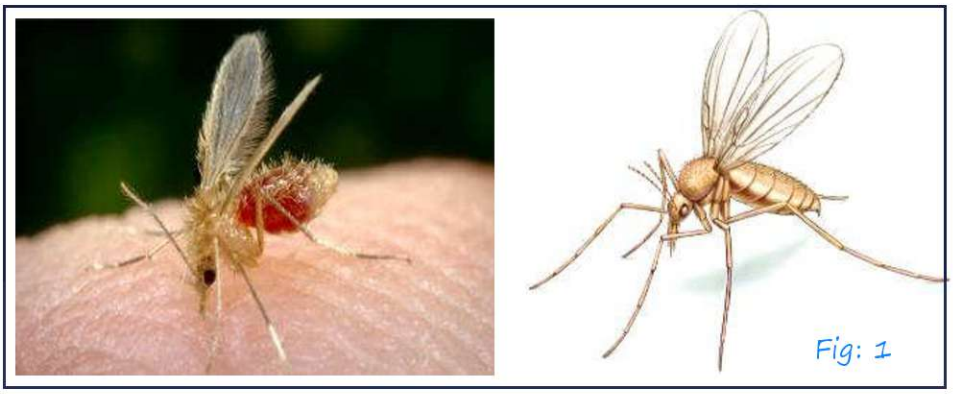


Fig: 1

- **It is also known as Phlebotomous.**
- **small insects, light or dark- brown in colour.**
- **They are smaller than mosquitoes, measuring 1.5 to 2.5 mm in length with their bodies and wings densely clothed with hair.**
- Identification: The difference between mosquito and sand-fly is that the latter has long legs, large wings and it does not fly, it only hops.

Diseases caused by sand-fly: (KOSO)

i. Kala azar

ii. Oriental sore

iii. Sand-fly fever

iv. Oroya fever (also known as CARRION DISEASE)

II. Tsetse fly

Tsetse flies or the Glossinae are bloodsucking flies, which present a general resemblance to the common housefly.

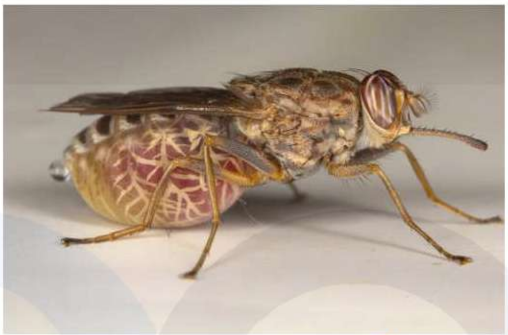


Fig: 2

- Identification: it has a typical brownish color. When the fly rests, it keeps its wings folded and one wing rests exactly on the other wing like blades of scissors.
- Both sexes of Tsetse fly bite.
- It does **NOT lay eggs it gives birth to single larva.**
- The disease caused by Tsetse fly is African sleeping sickness.
- The agent is **Trypanosoma brucei.**

III. Black fly/ Simulium

- **small robust flies with short ,stout legs, large broad wings and a short proboscis.**

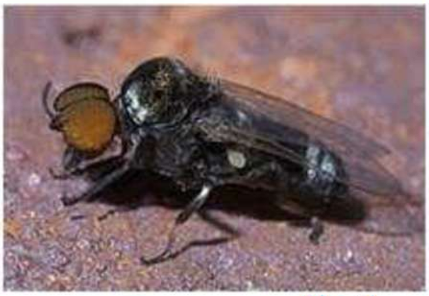


Fig: 3

- Black fly causes Onchocerciasis (River blindness)
- The agent is Onchocerca volvulus.

IV. Deer Fly/ Horse fly

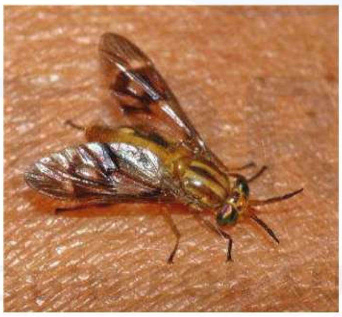


Fig: 4

- The diseases caused by this fly are Loa Loa and anthrax
- It mainly affects animals

V.House Fly

Fig: 5

- Diseases caused by house fly: (DAY Trap is the mnemonic)

  i. Diarrhea

  ii. Anthrax

  iii. Yaws

  iv. Trachoma

  v. Polio

Fleas 00:12:23

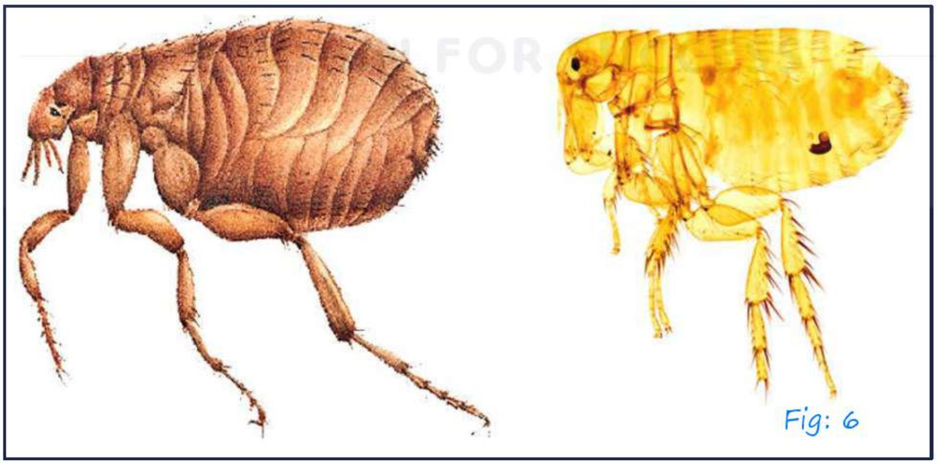


Fig: 6

- They are ectoparasites, small, bilaterally compressed, wingless insects with a hard chitinous exoskeleton and covered with backwardly directed strong bristles
- They are wingless but are powerful jumpers
- Diseases caused by flea are: (BMCH)

  i. **BUBONIC PLAGUE**

  ii. **MURINE OR ENDEMIC TYPHUS**

  iii. **CHIGGEROSIS**

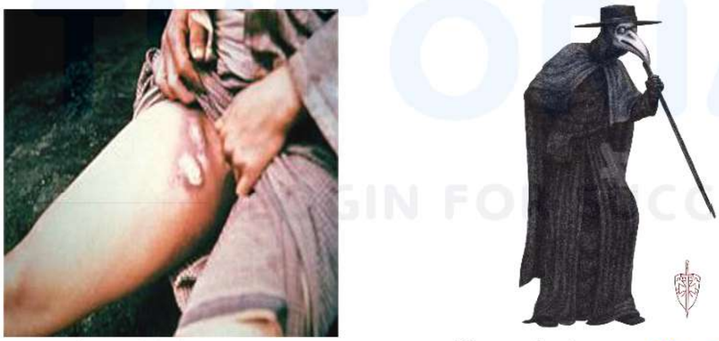
  iv. **HYMENOLEPSIS DIMINUTA**

Types Of Plagues 00:14:40

i. **Bubonic plague - most common**

ii. Pneumonic plague- Virulent

iii. Septicemic plague



Infected bubo

Plague doctor

Fig: 7

- The following indices are used in flea surveys:

  1.GENERAL FLEA INDEX : It is the average number of fleas of all species per rodent.

2.SPECIFIC FLEA INDEX : (X.cheopis index; X.astia index, etc.) It is the average number of fleas of each species, found per rodent.

3.PERCENTAGE INCIDENCE OF FLEA SPECIES : It is the percentage of fleas of each species, found per rodent.

4.RODENT INFESTATION RATE : It is the percentage of rodents infested with the various flea species.

I. Sand Flea

Fig: 8

- It is known as Tunga penetrans
- It causes secondary infections as gas gangrene, tetanus

II. Human flea

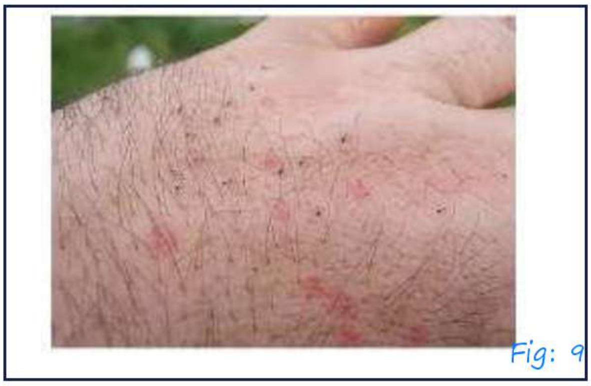


Fig: 9

- It causes dermatitis.
- It is known as is Pulex irritans

Louse:

- **small wingless ectoparasites of mammals and**
- **birds.**
- **They bite severely and are annoying pests.**
- **The lice that infest man are of three kinds : head louse (Pediculus**
- **capitis), body louse (Pediculus corporis), and pubic or crab**
- **louse (Phthirus pubis).**

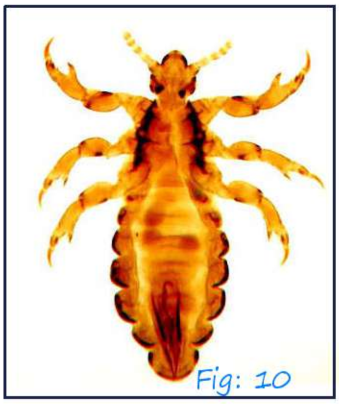


Fig: 10

- Diseases caused by louse are: (PRE-TenD)
  i. Pediculosis
  ii. Relapsing fever
  iii. Epidemic typhus
  iv. Trench fever
  v. Dermatitis

Reduvid bug: **also known as cone-nose bugs**

Fig: 11

- It causes **CHAGAS DISEASE** also known as **American sleeping sickness**
- The agent is ***Trypanosoma cruzi***

TUTORIALS LOGIN FOR SUCCESS

Class Arachnid

Ticks: The body of a tick is oval in shape and is not distinctly

separated into head, thorax and abdomen.

- we have two types of ticks-
  i. Hard tick (Scutum)
  ii. Soft tick (No scutum)

I. Hard tick

Fig: 12

- Hard tick has **a hard-outer covering called as Scutum**
- Head is visible outside.
- Hard tick is visible to naked eye.
- Diseases caused by hard tick are:(TB TRIK)

  i. Tularemia

  ii. Babesiosis

  iii. Tick paralysis

  iv. Tick encephalitis

  v. Tick hemorrhagic fever

  vi. Rocky Mountain spotted fever

  vii. Indian tick typhus

  viii. KFD

II. Soft tick

Fig: 13

- It is soft and does not have hard outer covering
- Head is not visible outside.
- It is visible to naked eye
- Disease caused by soft tick are:

  i. Relapsing fever

  ii. Q fever

  iii. KFD (outside India)

III. MITES:

Mites (chiggers) resemble ticks in their general Appearance.

They are 2 types of mites important as per public health point of view;

(1) the trombiculid mite

(2) the itch mite (Acarus scabie).

- Trombiculid mite/ red mite / berry mite / harvest mite

Fig: 14

- Scrub typhus is caused by trombiculid mite
- **PATHOGENIC FEATURE OF SCRUB TYPHUS IS ESCHAR**

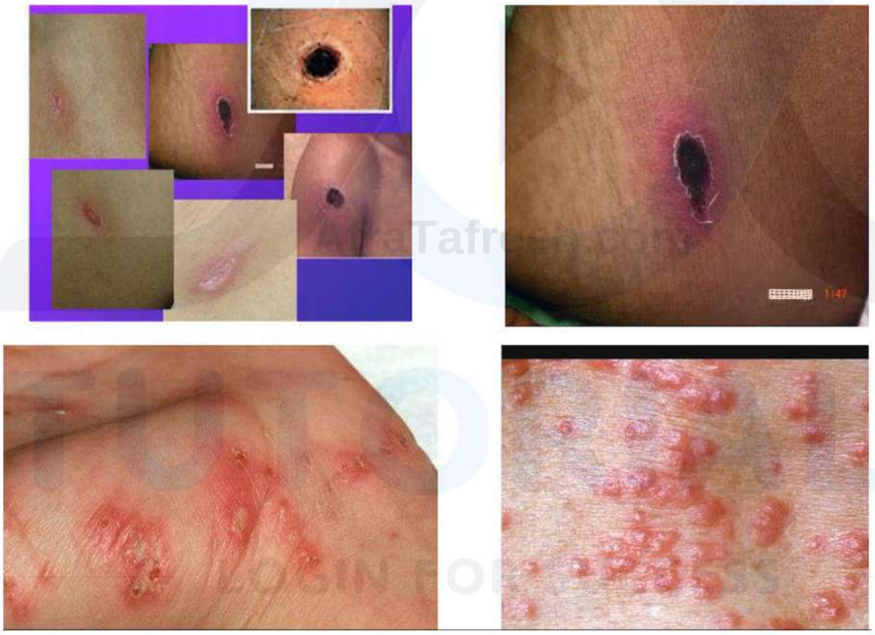


Fig: 15

- **Mite larva transmits diseases**

AmaTafreen.com

ITCH MITE: (Sarcoptes scabiei or Acarus scabiei)

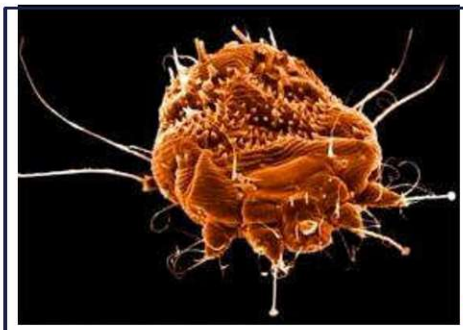


Fig: 16

- Itch mite causes scabies
- It belongs to Class Crustacea

Cyclops 00:24:52

- **Cyclops or water flea is a crustacean present in most collections of fresh water.**
- Disease caused by cyclops is Dracunculiasis/ guinea worm infection
- These are big worms that appear on the skin.
- When skin comes in contact with water, the worm comes out and from the worm larvae comes out. The larvae is eaten by cyclops and when the water containing cyclops is consumed, the larvae come out in the stomach and cycle continues.

1. Cyclops is the intermediate host of Dracunculiasis or guinea-worm disease. Man acquires infestation by drinking water containing infected cyclops.

2.Cyclops mediates also as one of the intermediate hosts of fish tape worm, Diphyllobothrium latum infestation. The disease is rare in India.

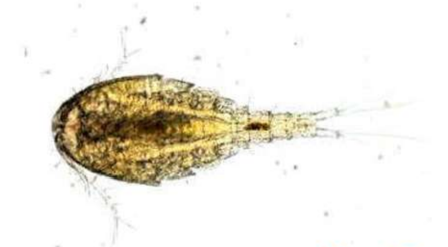


Fig: 17

Life Cycle 00:26:20

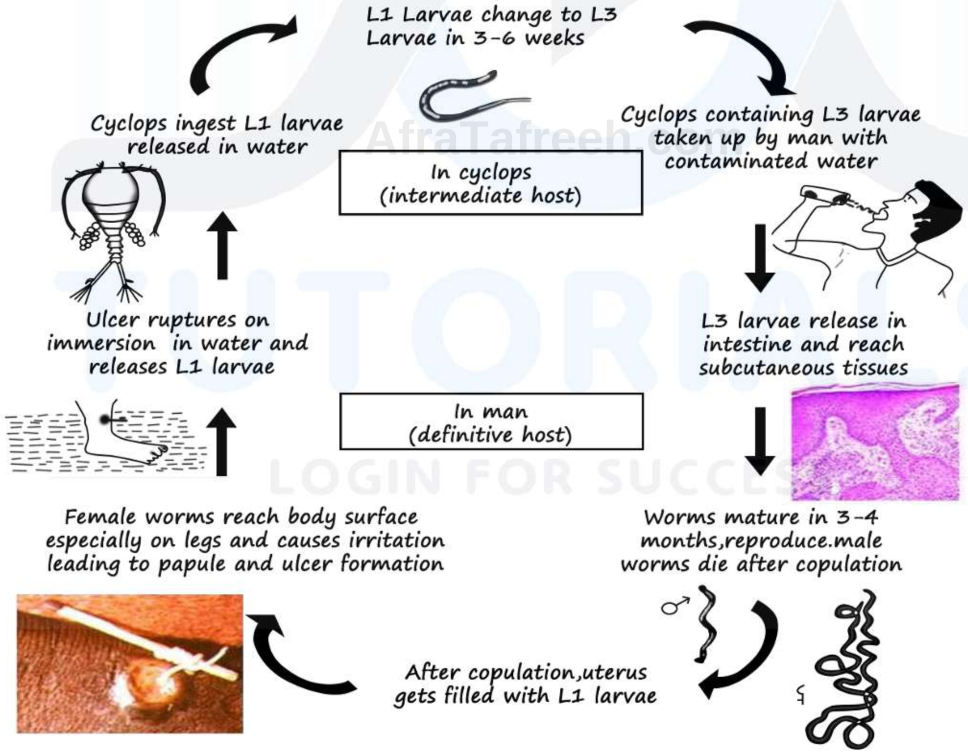

L1 Larvae change to L3 Larvae in 3-6 weeks
Cyclops containing L3 larvae taken up by man with contaminated water
Cyclops ingest L1 larvae released in water
In cyclops (intermediate host)
Ulcer ruptures on immersion in water and releases L1 larvae
L3 larvae release in intestine and reach subcutaneous tissues
In man (definitive host)
Female worms reach body surface especially on legs and causes irritation leading to papule and ulcer formation
Worms mature in 3-4 months,reproduce.male worms die after copulation
♂
♀
After copulation,uterus gets filled with L1 larvae

Fig: 18

Rickettsia 00:27:18

- They are small pleomorphic bacteria which are non-motile and found usually in groups inside cells.

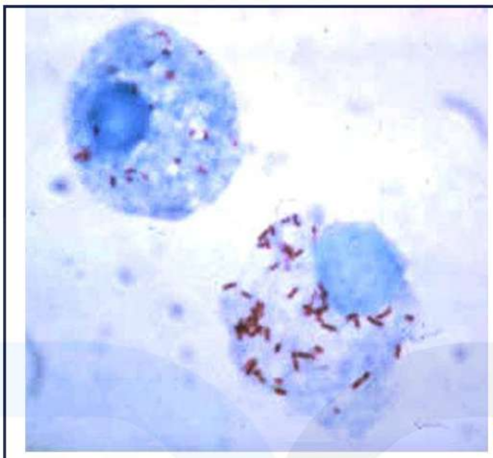


Fig: 19

Typhus Group	Epidemic typhus	Rickettsia Prowazekii	Louse
	Endemic	Rickettsia Typhi	Flea
Spotted Fever Group	Rocky mountain spotted fever	Rickettsia rickettsia	Tick
	R. Pox	Rickettsia Akari	Mite
	Mediterranean spotted fever or Indian R. Conorii tick typhus	Rickettsia Conorii	Tick
Other	Q. Fever	Coxiella burnetii	Air Borne/Tick

TUTORIALS LOGIN FOR SUCCESS

	Trench Fever	Rochalimaea Quintana (Bartonella Quintana)	Louse
	Scrub typhus (Chigger borne Typhus)	Rickettsia or Orientia tsutsugamushi	Mite
	Ehrlichiosis	Ehrlichia	Tick

- Easy ways to remember
  - **LET > Louse causes Typhus and Trench fever**
  - TERM > Tick causes Ehrlichiosis, Rocky mountain spotted fever, Mediterranean fever
  - SPM > Mite causes Scrub typhus, Rickettsial pox

Q FEVER 00:31:19

- It is caused by **Coxiella burnetti**
- Mode of transmission is through inhalation
- No vector involved
- No skin lesions.

BIOLOGICAL TRANSMISSION AND INSECTICIDES

- A vector is an arthropod that transmits disease from one person to another by carrying an agent
- Biological transmission occurs when the vector uptakes the agent, usually through a blood meal from an infected animal, replicates and/or develops it, and then regurgitates the pathogen onto or injects it into a susceptible animal.
- At the time of transmission when agent is in the body of the vector, it can undergo different types of changes.
- The changes are:
  - **i. Propagation- it multiplies and increases in number**
  - **ii. Development changes from one form to another form (as a part of development)**

- Depending on the change that happens in a vector, there are **3 types of named biological transmission methods**:
  - i. PROPAGATIVE - only multiplication e. g plague, yellow fever
  - ii. CYCLO PROPAGATIVE- multiplication + cyclical change E.g. malarial parasite
  - iii. CYCLO DEVELOPMENTAL-only cyclical development alone - filarial worm, guinea worm

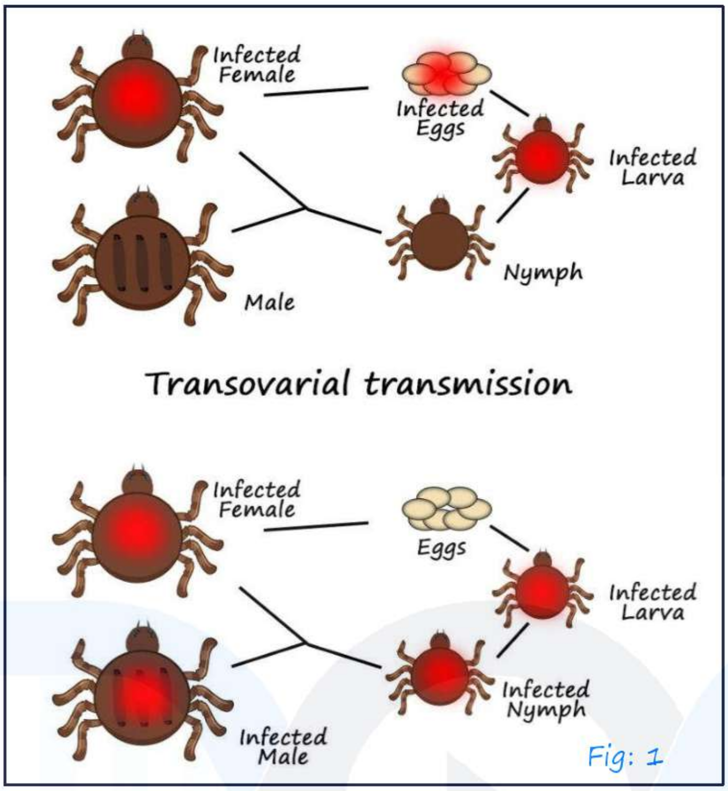

Infected Female
Infected Eggs
Infected Larva
Male
Nymph
Transovarial transmission
Infected Female
Eggs
Infected Larva
Infected Male
Infected Nymph

Fig: 1

- **Transovarial transmission**: the transmission of an infectious agent from parent to offspring via infection of the developing egg which subsequently results in infectious adult arthropods.
- means through ovary (through eggs) i.e. from mother to child (vertical transmission) E.g. **Rickettsia ricketsii in ticks**
- **Transstadial transmission**: the sequential passage of parasites acquired during one life stage, or stadium, through the molt to the next stage(s) or stadium.
- this is from one stage to another i.e. from larva to nymph. E.g. **Borrelia Burgdorferi in ticks**

Insecticides

- There are 3 classes of insecticides:
- Contact poison, stomach poison, fumigants
- Contact poisons again divided in to Natural and synthetic insecticides.
- Synthetic insecticides are of 3 types: organochlorine, organo- phosphorus, carbamates.

Group 1 - organo-chlorine

- DDT, BHC, Lindane, Dieldrin, methoxychlor

Group 2 - organophosphorus

- Malathion
- Parathion
- Fenthion
- Diazinon
- Fenitrothion
- Dioxathion
- Chlorthion
- Chlorpyrifos

Group 3 - carbamate insecticides

- Carbaryl, Propoxur

COMPONENTS OF COMMUNICATION AND TYPES OF COMMUNICATION

Communication: 00:00:12

- It is a **process of exchanging ideas or feelings.**
- Components in communication:

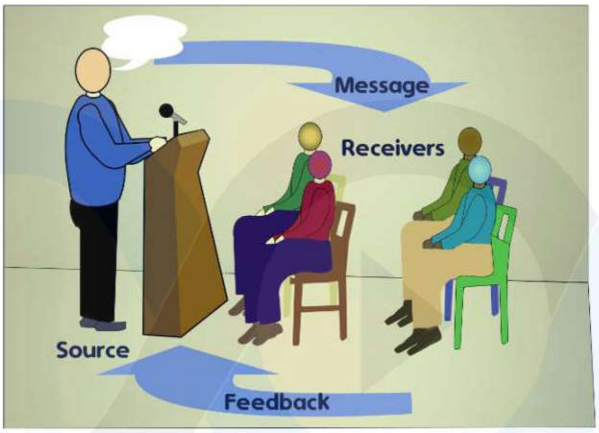


Fig: 1

i. Source/sender

ii. Message/idea

iii. Channel/medium

iv. Receiver/ Audience

v. Feedback/effect

Types Of Communication 00:02:38

1

i. One-way communication- also called Didactic method (Centre to audience)

ii. Two-way communication- also called Socratic method (Both ways)

2

i. Verbal- words are used

ii. Nonverbal- gestures, facial expressions, body language- it is the most common & most powerful. Example: emojis now a days

3

i. Formal- There is line of authority

ii. Non-formal- casual, no line of authority, also known as grape wine communication. It is more effective than formal

This type of communication and spreads very fast.

GROUP DISCUSSION METHODS

Panel discussion 00:00:17

- It involves a group of people, gathered to discuss a topic in front of an audience. Panels usually include a moderator who guide the discussion, and some elicits audience questions, with the goal of being informative and entertaining.
- There is a panel of experts and the discussion is on one particular topic.
- the discussion takes place in front of a group of audience.

Fig: 1

- **Moderator controls the panel discussion**
- Members discuss between each other
- There are no set speeches in a panel discussion.
- Moderator will be regulating, introducing panelist and ask one of them to start and then its go on.
- Audience may ask questions at the end

Symposium 00:01:53

- There is a panel of experts
- It is series of speeches on a selected subject
- The discussion takes place in front of a group of audience
- In symposium topic is divided among the members and each member prepares and presents a part of the topic in front of the audience using audio and visual aids.
- There is no discussion among symposium members.
- A chairman/moderator will summarize at the end, audience will be asking questions after that.
- E.g. covid19 symposium 1 person discusses about epidemiology another person about the clinical features, another person about treatment, another person about prevention.

Workshop 00:03:43

- All are working (including the audience)
- Each workshop has an agenda
- It is a meeting at which a group of people engage in intensive discussion and activity on a particular subject or project
- All the audience that attend workshop are divided into small groups

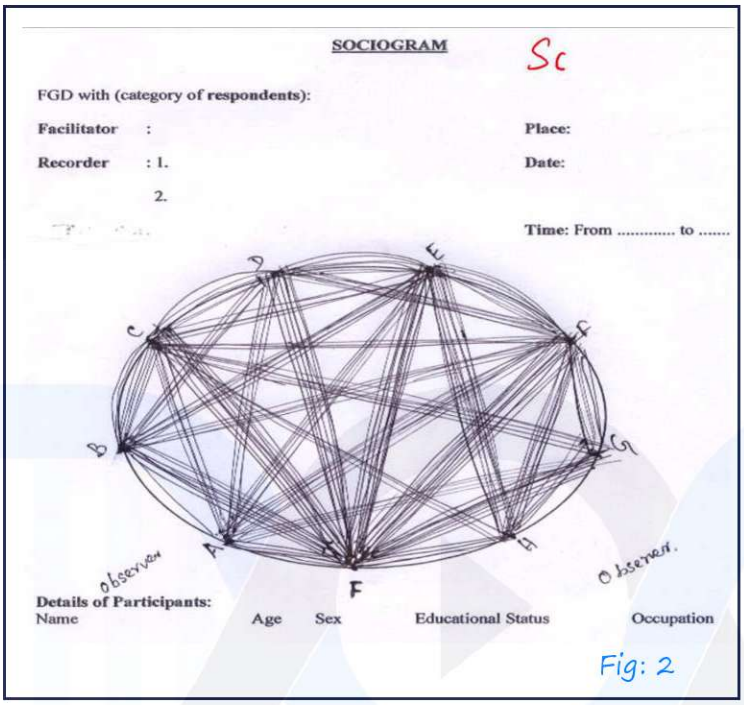
- Each group is given a task and each of it comes up with it suggestion/recommendation.
- At the end of the workshop 1 person from each group can come and discuss or present their findings
- The suggestions from all groups can be compiled and made into an action plan.
- E.g. Workshop on prevention and control of Covid-19
  - Group 1 – activities of PHC
  - Group 2 – activities of resident's association
  - Group 3 – activities of Local Self Governance.
  - Group 4 – activities of Medical college
- Workshop is culminated after a series of meetings usually more than 4.

FOCUS GROUP DISCUSSION (FGD) 00:06:36

TUTORIALS LOGIN FOR SUCCESS

- A focus group discussion involves gathering people from similar backgrounds or experiences together to discuss a specific topic of interest.
- 6 to 12 members sit around a table and discuss a topic
- 1 leader and 1 recorder will be present.
- The recorder records the flow of communication and makes a picture of the flow of information in the form of sociogram for FGD.
- A sociogram is a graphic representation of social links that a person has. It is a graph drawing that plots the

structure of interpersonal relations in a group situation.



SOCIOGRAM Sc

FGD with (category of respondents):

Facilitator : **Place:**

Recorder : 1. **Date:**

2.

Time: From .... to ....

D
E
C
f
B
G
A
F
H
observer
Observer.

Details of Participants:

Name Age Sex Educational Status Occupation

Fig: 2

SPECIAL METHODS OF COMMUNICATION

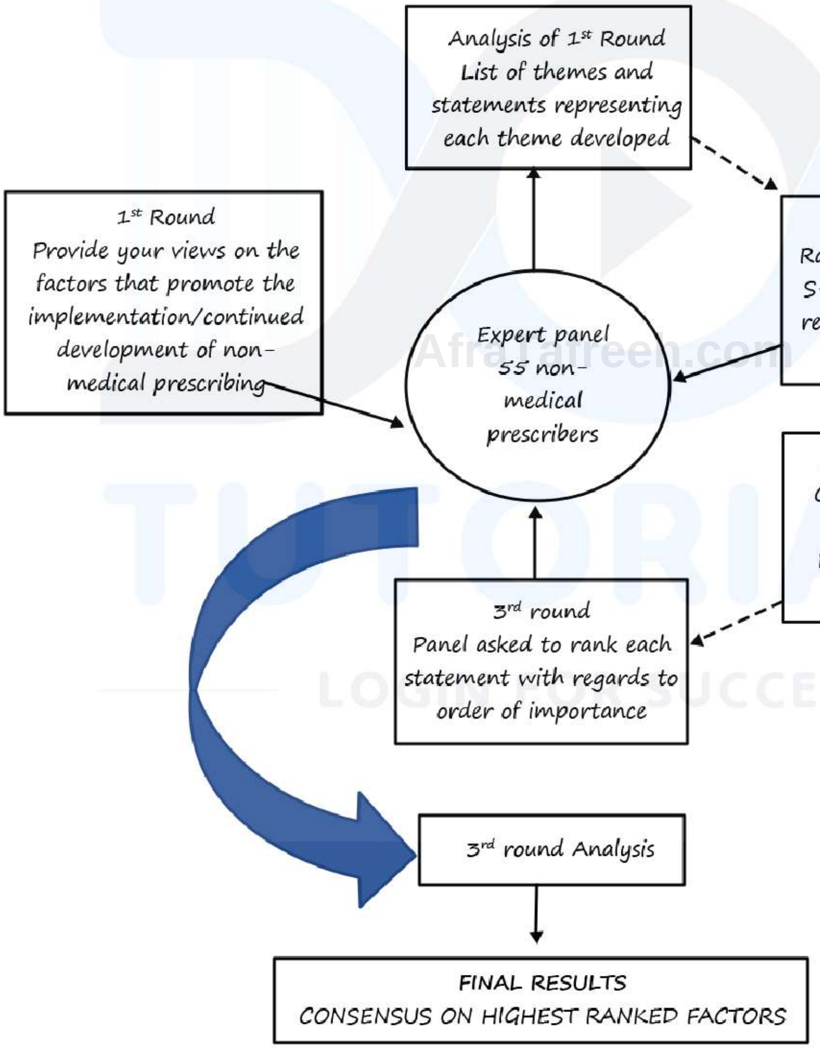
i. Delphi method

ii. Counselling

iii. SPIKES technique/protocol

iv. Johari window

Delphi Method 00:00:49


Analysis of 1st Round
List of themes and statements representing each theme developed
1st Round
Provide your views on the factors that promote the implementation/continued development of non-medical prescribing
2nd Round
Rate each statement on a 5-point Likert scale with regards to the extent you agree/disagree
Expert panel
55 non-medical prescribers
Analysis of 2nd round
Criteria for inclusion in round 3 applied.
Preparation 3rd round questionnaire
3rd round
Panel asked to rank each statement with regards to order of importance
3rd round Analysis
FINAL RESULTS
CONSENSUS ON HIGHEST RANKED FACTORS

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- The Delphi method is a forecasting process framework based on the results of multiple rounds of questionnaires sent to a panel of experts. After each round of questionnaires, the experts are presented with an aggregated summary of the last round, allowing each expert to adjust their answers according to the group response.

- Forecasting method for obtaining consensus/or a single answer from a panel of experts

- Done in different rounds
- Round 1
  - Questionnaire with doubts is mailed to the panel
  - A Summary of everyone's opinion is made
- Round 2
  - Questionnaire + Summary
  - To reconsider opinions
  - To obtain one single answer from the panel

Counselling Vs Advice: 00:04:38

- In advice, there is no other alternative
- In counselling, Alternatives are given and one can choose the one that is most appropriate
- The provision of professional assistance and guidance in resolving personal or psychological problems is form of counselling.

Gather approach for counselling (most common method) 00:06:28

- 6 steps
  - G – Greet clients
  - A – Ask problems or reason for coming
  - T – Telling different choices
  - H – Help clients to make voluntary decisions
  - E – Explain fully the chosen decision
  - R – Return to follow up visit
- Eg: The GATHER approach to counseling—Greet, Ask, Tell, Help, Explain, and Return--has documented effectiveness in FP programs. The more of the GATHER elements a counselor uses, the more satisfied clients are with their care and the more likely they are to use contraception.

Spikes Protocol 00:08:23

- For breaking the bad news

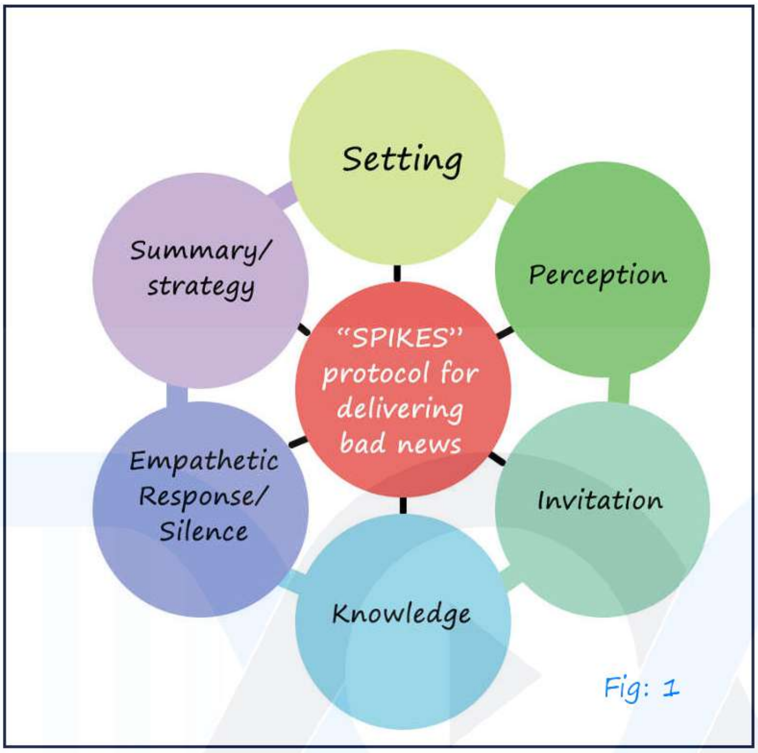
Setting
Perception
Invitation
Knowledge
Empathetic Response/ Silence
Summary/ strategy
"SPIKES" protocol for delivering bad news

Fig: 1

- The SPIKES protocol for sharing bad news consists of six distinct parts.
  - Setting
  - Perception
  - Invitation
  - Knowledge
  - Empathetic response/silence
  - Summary/Strategy

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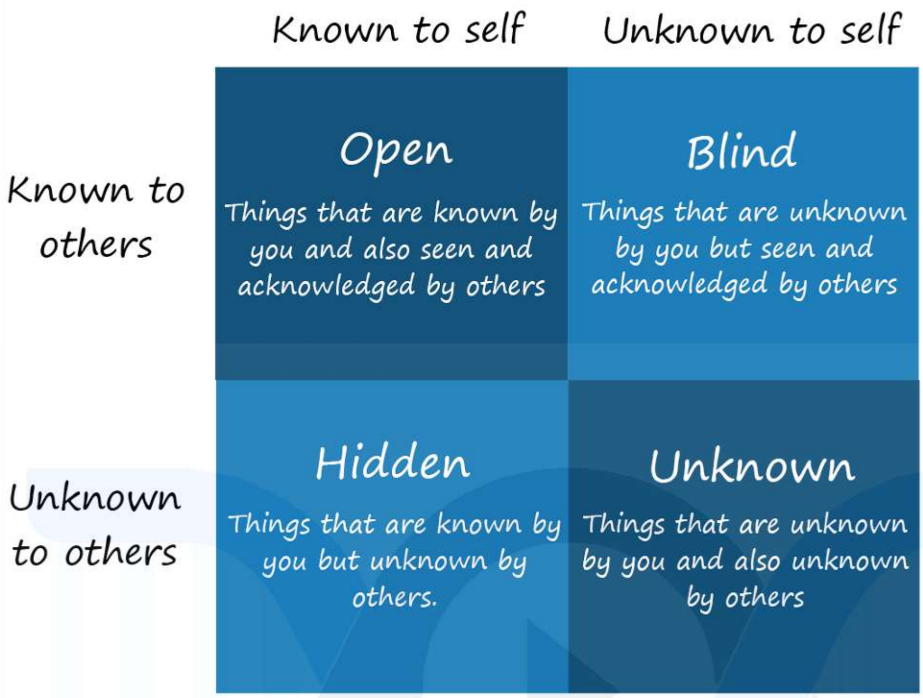
Johari Window 00:10:00



	Known to self	Unknown to self
Known to others	**Open** Things that are known by you and also seen and acknowledged by others	**Blind** Things that are unknown by you but seen and acknowledged by others
Unknown to others	**Hidden** Things that are known by you but unknown by others.	**Unknown** Things that are unknown by you and also unknown by others

Fig: 2

- The Johari window is a technique designed to help people better understand their relationship with themselves and others.
- The Johari Window helps you to categorize conscious and subconscious areas of your life.
  - Explained by Joseph & Harry –thus the name Jo-hari
  - This is to know about yourself and the people around

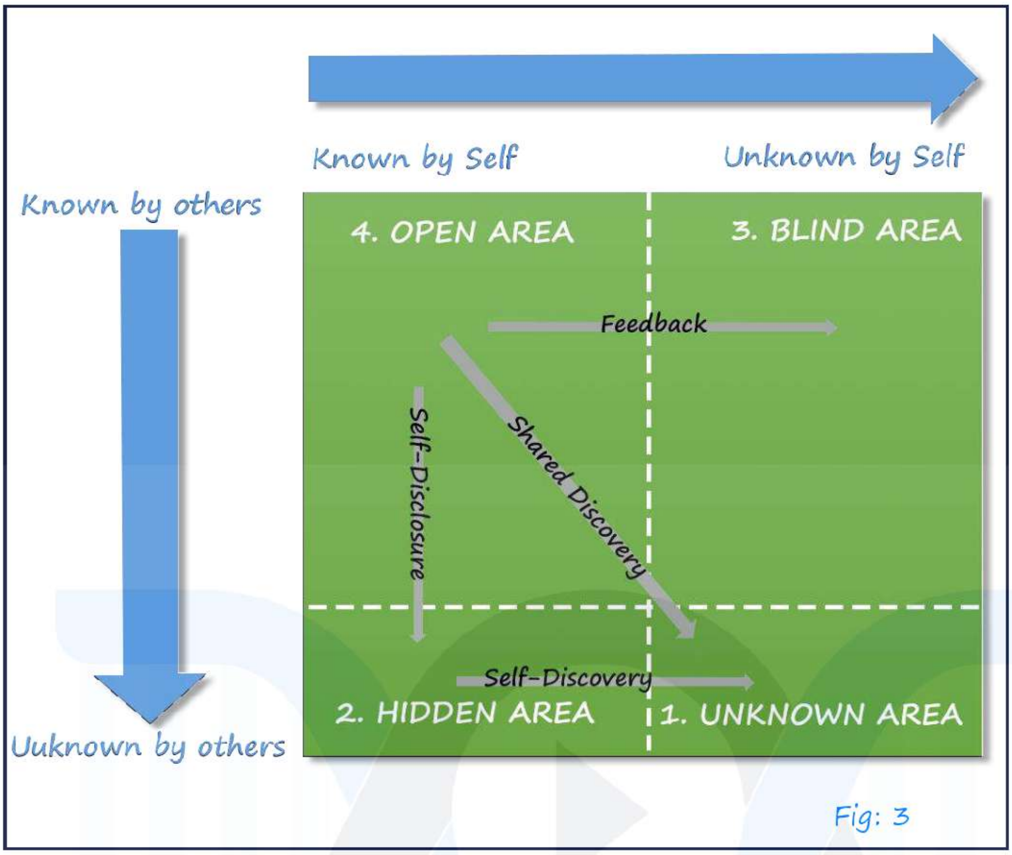

Known by Self
Unknown by Self
Known by others
Uknown by others
4. OPEN AREA
3. BLIND AREA
Feedback
Self-Disclosure
Shared Discovery
Self-Discovery
2. HIDDEN AREA
1. UNKNOWN AREA

Fig: 3

Phases Of Health Education 00:13:38

- 3 phases
- Phase 1 → Awareness & Interest
- Phase 2 → Trial and evaluation
- Phase 3 → Adoption & dissemination

Depending On The Change Accepted, There Are 3 Kinds Of People: 00:16:50

- Pro-changers → Trend setters, receptive to new ideas
- Changes → Followers of pro changes (If successful)
- Non-changes → Obstacles to public health

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FAMILY

Difference Between Family and Household 00:00:30

A family consists of two or more people (one of whom is the householder) related by birth, marriage, or adoption residing in the same housing unit. A household consists of all people who occupy a housing unit regardless of relationship.

Family	Household
Biologically related	Not biologically related
Eating from common kitchen	Not eating from common kitchen

Types Of Family 00:01:47

i. Nuclear family
  - Includes father, mothers and their dependent children

ii. Extended family
  - grandparents, aunts, uncles, and cousins, either all living nearby or within the same household.

iii. Joint family: Joint families are composed of sets of siblings, theirs spouses, and their dependent children.

iv. New family
  - Family of less than 10years duration

- They are targeted for family planning

v. Problem Family

- A family that lags behind the rest of the families in a community because of either poverty. Illiteracy abuse etc.
- Problem family gives rise to delinquent children

vi. Broken Family

- Father and mother separated either by death or divorce

Phases In Family Cycle 00:05:22

Phase	**Description**	**Beginning**	**End**
1	Formation	Marriage	Birth of 1st Child
2	Extension	Birth of 1st child	Birth of last child
3	Complete extension	Birth of last child	1st child leaves home
4	Contraction	1st child leaves home	Last child leaves home
5	Complete contraction	Last child leaves home	1st spouse dies
6	Dissolution	1st spouse dies	Death of survivor

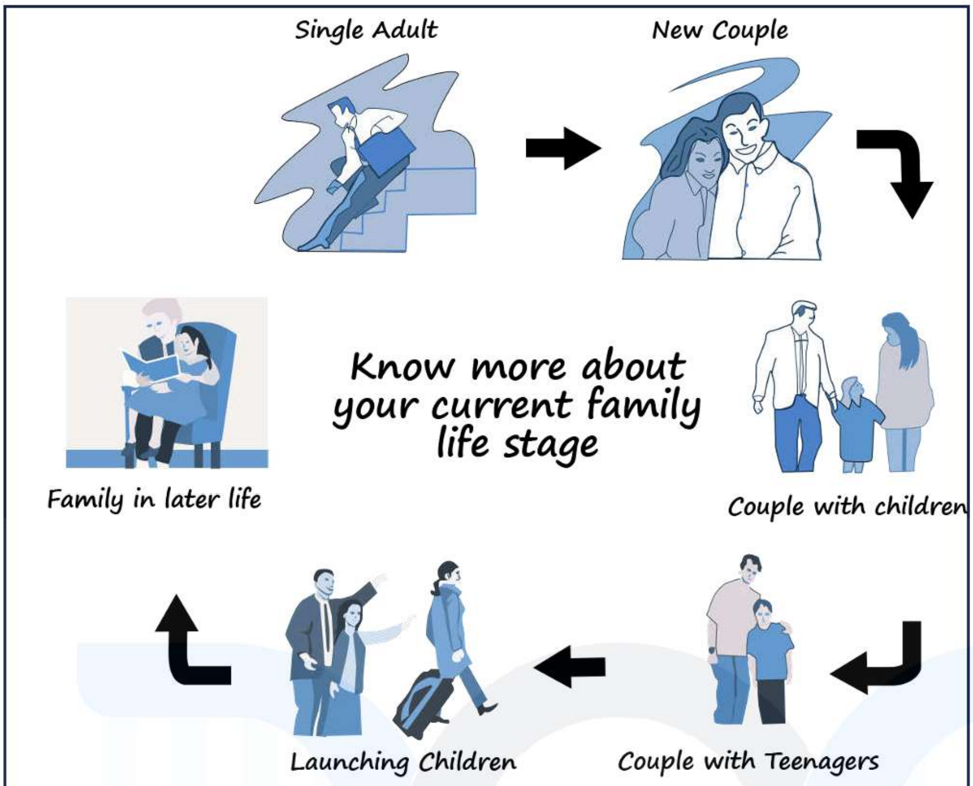
Single Adult
New Couple
Know more about your current family life stage
Family in later life
Couple with children
Launching Children
Couple with Teenagers

Fig: 1

Stages of the Family Life Cycle

SOCIETY AND HEALTH

- The problem in the society that can affect the health of the people living in it are called social problems
- Social problem is – poverty, unemployment, migration, crime, delinquency, drug abuse, child abuse, crime against women, crime against children, discrimination on the basis of Caste, class & religion, corruption, family and health problems, education, political, economic, cultural and environment issues and human rights violation.

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Social Constraints 00:00:51

Social Constraints are the external controls made by the society upon the individual

- Poverty and destitution
- Illiteracy and ignorance
- Migration and environmental crisis
- Industrialization and urbanization

Social Evils 00:01:04

Social evils are the issues that directly or indirectly affect the members of a society and are considered a point of controversy or a problem in regard to moral values.

- Smoking & drinking

- Casteism
- Gender bias & discrimination
- Child neglect & abuse
- Child labor & abandonment
- Stress & stress behavior
- Crime & corruption
- Prostitution & STD's

Social Deviance 00:01:26

It describes an action or behavior that violates social norms, including a formally enacted rule (e.g., crime) as well as informal violations of social norms (e.g., rejecting folkways and mores).

- Drug abuse
- Juvenile delinquency
- Suicide

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- Studying the relationship between the social problem & its effects on health is called **SOCIAL PATHOLOGY**
- Social problem is **uncovered by social survey**, It is a methodical gathering of social data from a sample of the target population through standardized interviews or questionnaires.

Below poverty line (BPL) 00:03:23

- Definition: It is an economic benchmark related to threshold income.

At international level

Extreme poverty (<1.9 USD/day)

Moderate poverty (<3.10 USD/day)

At National Level:

BPL criteria	Rural areas	Urban areas
Per capita calorie intake	<2400 kcal/day	<2100 Kcal/day
Per capita income	Rs.32 per day	Rs. 47 per day

Rangarajan committee – 30% of the population in India are below poverty line.

Disease Of Poverty 00:05:21

- 3 primary diseases

"ATM"

AIDS

TB

Malaria

- 3 additional disease →
  - ✓ Pneumonia
  - ✓ Measles
  - ✓ ADD

GLOBAL HUNGER INDEX 00:06:51

- Put forth by the international food policy research institute.
- A tool designed to comprehensively measure and track hunger at global, regional, and national levels
- Only for developing countries (usually 120 countries)
- 0 to 100 is the scale
  - ✓ '0' is no hunger
  - ✓ '100' is worse
- Indicators → (4 average is taken)
  - ✓ % if undernourished population in the country: the share of the population that is undernourished (that is, whose caloric intake is insufficient)
  - ✓ % < 5 years' child deaths: the mortality rate of children under the age of five (in part, a reflection of the fatal mix of inadequate nutrition and unhealthy environments)
  - ✓ % < 5 years child wasting : the share of children under the age of five who are wasted (that is, who have low weight for their height, reflecting acute undernutrition)

- ✓ % of < 5 years child stunting : the share of children under the age of five who are stunted (that is, who have low height for their age, reflecting chronic undernutrition)

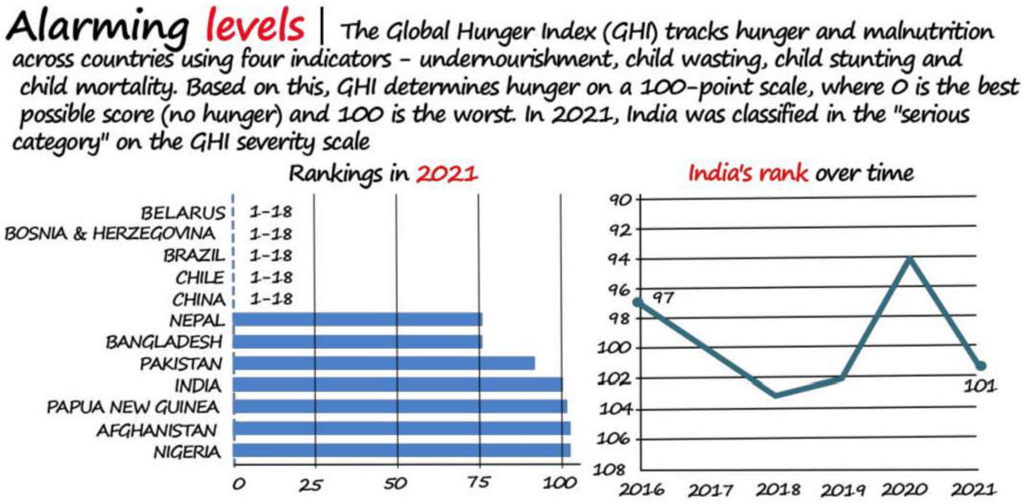
Interpretation

- < 9.9 → Low hunger
- 10.0 – 19.9 → Moderate hunger
- 20.0 -34.9 → Serious hunger
- 35.0 – 49.9 → Alarming hunger
- > 50 → Extremely alarming hunger

RANKING (developed countries are not included)

- Cuba, Kuwait, Ukraine, Turkey-1 (16 countries)
- China (25)
- Nepal (72)
- Sri Lanka (84)
- India (102)
- Pakistan (106)
- Afghanistan (111)
- Central African Republic (119)

GHI 2021- India ranked 101 out of 116 countries.



Alarming levels | The Global Hunger Index (GHI) tracks hunger and malnutrition across countries using four indicators - undernourishment, child wasting, child stunting and child mortality. Based on this, GHI determines hunger on a 100-point scale, where 0 is the best possible score (no hunger) and 100 is the worst. In 2021, India was classified in the "serious category" on the GHI severity scale

Rankings in 2021
BELARUS 1-18
BOSNIA & HERZEGOVINA 1-18
BRAZIL 1-18
CHILE 1-18
CHINA 1-18
NEPAL
BANGLADESH
PAKISTAN
INDIA
PAPUA NEW GUINEA
AFGHANISTAN
NIGERIA
0
25
50
75
100
India's rank over time
90
92
94
96
98
100
102
104
106
108
97
101
2016
2017
2018
2019
2020
2021

Hidden Hunger 00:10:50

- Micronutrient deficiency (vitamins & minerals)
- Occurs when the quality of food that people eat does not meet their nutrient requirements, so they are not getting the essential vitamins and minerals they need for their growth and development

World Happiness Index 2020 00:11:25

✓ Depends on,

- Gross Domestic Product Per Capita (Purchasing Power Parity).
- Social Support.
- Healthy life expectancy at birth.
- Freedom to make life choices.
- Generosity.
- Perceptions of corruption.

✓ In 2020, 126 countries participated, out of which

- Rank 1 → Finland

- 2 → Denmark
- 3 → Switzerland
- 144 → India

In 2021- India ranks 139 out of 149 countries

Finland -1, Iceland-2, Denmark-3, Switzerland-4 etc

Socio Economic Indicator 00:13:03

MNEMONIC - HE FLAGGED

- **H**ousing
- **F**amily size
- **L**iteracy rate
- **A**vailability of food (per capita calorie)
- **G**NP per capita
- **G**rowth rate
- **E**mployment
- **D**ependency ratio

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Socio Economic Status Scales (SES) 00:14:28

- Urban SES → JSK →
  - ✓ Jalota scale
  - ✓ Shrivastava scale
  - ✓ Modified Kuppuswamy scale → (education & occupation of head of family & family income)
  - ✓ Kulshreshta scale
- Rural SES → Super →

- ✓ Shirpurkas scale
- ✓ Udai pareek scale
- ✓ BG Prasad scale
- ✓ Radhukar scale

Students scale

- Bhardwaj scale

Non-Indian SES

- Hollingshead scale, Henderson scale
- WHO scale- for mixed Population?

Purchasing Power Parity (PPP)

- **PPPs are the rates of currency conversion that equalize the purchasing power of different currencies by eliminating the differences in price levels between countries.**
- **In their simplest form, PPPs are simply price relatives that show the ratio of the prices in national currencies of the same good or service in different countries**
- Comparing purchasing power of various currency
- Usually compared to dollar
- Number of units of country's currency required to buy the same amounts of goods and services in domestic markets as one dollar would buy in USA

Big Mac Index

- **It is the informal method of calculating PPP**

Fig: 1

Variants to calculate PPP

- Starbucks Index
- IPod Index

Fig: 2

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MENTAL HEALTH

- Intelligence quotient (IQ) → one of the methods to assess intelligence.
- First intelligence test → Binet and Simon (1896).
- $IQ = \frac{\text{mental age}}{\text{Chronological age}} \times 100$ = IQ, according to Stern's IQ test which is for children

Wais 00:02:03

- For adults → Wechsler adult intelligence scale (WAIS) is used
- Emotional intelligence quotient → is how well you manage emotions
- Social intelligence → is how well you manage people around you (society)
- Emotional and Social Intelligence (ESI) is defined as a set of competencies demonstrating the ability one has to recognize their behaviors, moods, and impulses, and to manage them best according to the situation
- Normal IQ = 90 to 110

Levels of intelligence based on IQ 00:02:39

Levels of intelligence	IQ range
- idiot	0-24
- imbecile	25-49
- moron	50-69
- borderline	70-79
- Low normal	80-89
- normal	90-109
- superior	110-119
- Very superior	120-139
- Near genius	140 and over

- WHO categorization of mental retardation.

Mental status	IQ range
- normal	70 and over
- Mild mental retardation	50-69
- Moderate mental retardation	35-49
- Severe mental retardation	21-34
- Profound mental retardation	20 & below

Flynn effect 00:05:07

- The tendency of IQ scores to change over time, and specifically, the apparent increase in intelligence in the general population evidenced by a steady increase in IQ scores.

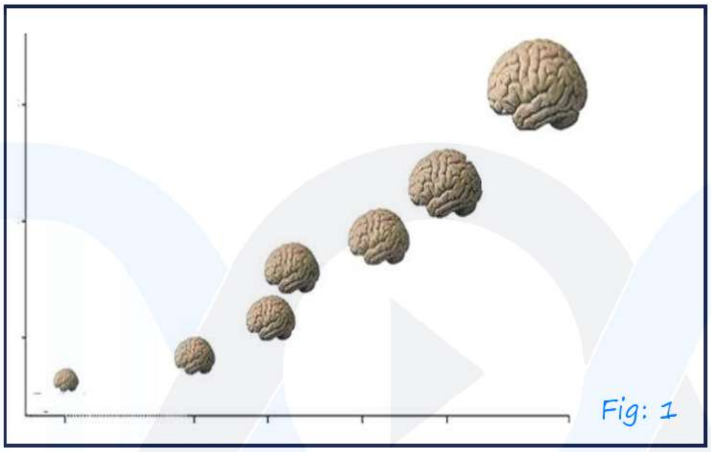


Fig: 1

- Average IQ increases with generation.

Learning objective 00:06:13

- To bring about a desirable behavioral change
- 3 domains of learning are –
  i. Knowledge → brain → cognitive learning
  ii. Attitude → heart → affective learning
  iii. Skills → hands → psychomotor domain

As per Competency Based Medical Education

Communication is added

Fig: 2

- Abraham Maslow → " Maslow's hierarchy of needs"

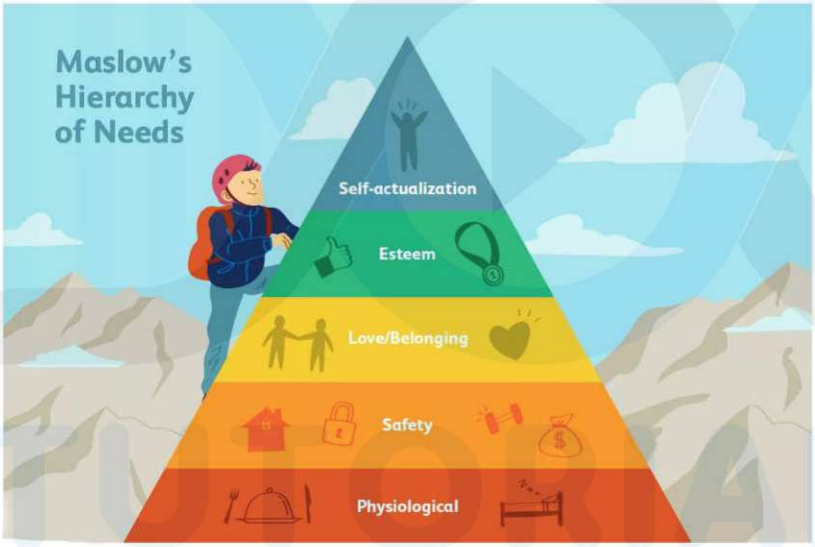

Maslow's Hierarchy of Needs
Self-actualization
Esteem
Love/Belonging
Safety
Physiological

Fig: 3

Maslows hierarchy of needs 00:12:56

- From the bottom of the hierarchy upwards, the needs are: physiological (food and clothing), safety (job security), love and belonging needs (friendship), esteem, and self-actualization.
- Needs lower down in the hierarchy must be satisfied before individuals can attend to needs higher up.

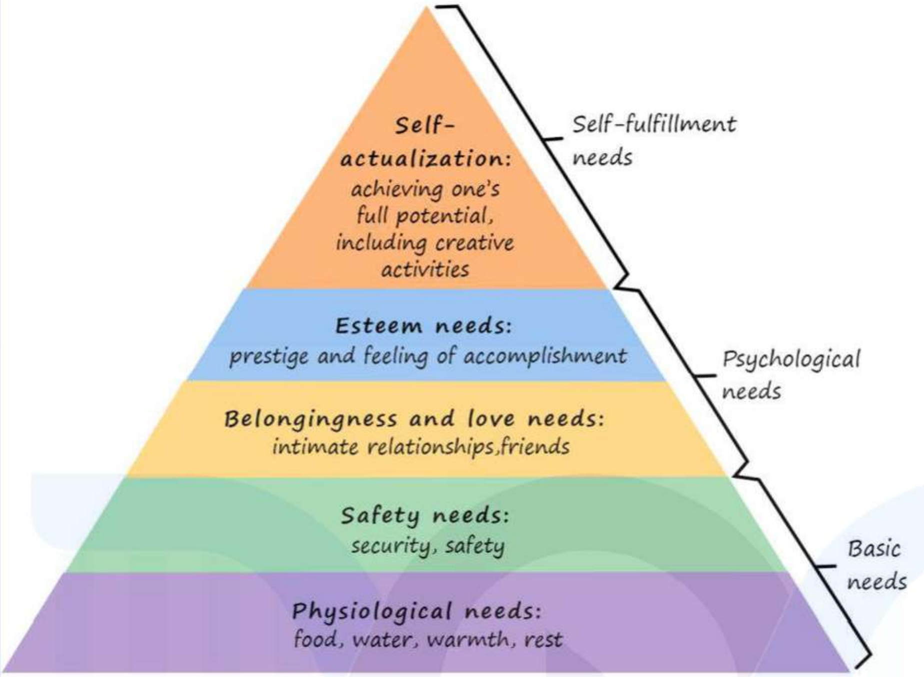
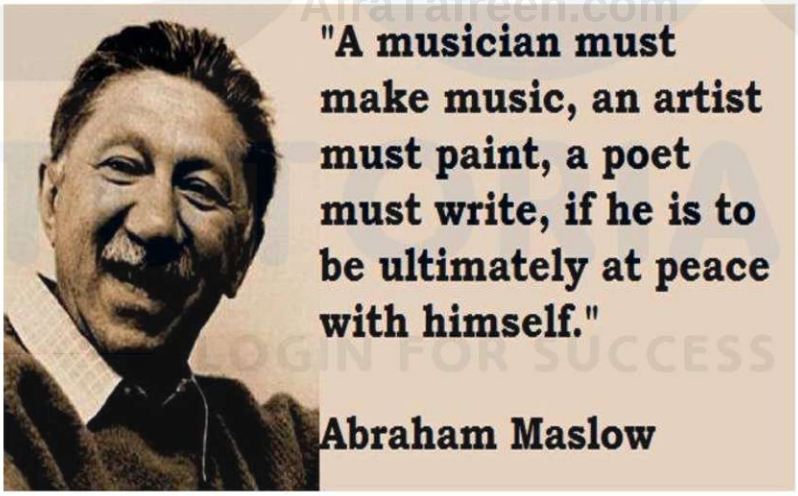

Self-actualization: achieving one's full potential, including creative activities
Esteem needs: prestige and feeling of accomplishment
Belongingness and love needs: intimate relationships, friends
Safety needs: security, safety
Physiological needs: food, water, warmth, rest
Self-fulfillment needs
Psychological needs
Basic needs

Fig: 4



"A musician must make music, an artist must paint, a poet must write, if he is to be ultimately at peace with himself."

Abraham Maslow

Fig: 5

HEALTH SYSTEM IN INDIA

- The present health system we see now took shape in the 1970's, before that good hospitals and good doctors and good health were concentrated in urban areas and the rural areas were devoid of good health care
- In the **year 1977** during the **30th World Health Assembly** held in **Geneva** a new goal was introduced i.e., **HEALTH FOR ALL BY 2000**
- It was in 1978 at Alma Ata primary health care was introduced as a new tool for achieving health for all by 2000
- first National Health Policy of India (NHP) got formulated only in 1983 with its main focus on provision of primary health care to all by 2000

Primary health care 00:01:52

- "Essential health care" made universally accessible to individuals and families through their full participation and at a cost the community and country can afford.
- Primary health care has got 8 elements and 4 principles.
- The 8 elements are-
  - E- Education about health problems
  - L- locally endemic disease prevention

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- E- essential drugs
- M- MCH and family planning
- E- EPI (immunization)
- N- nutrition
- T- treatment of common diseases
- S- safe water supply and sanitation

- The 4 principals are-

  i. Community participation

  ii. Appropriate technology

  iii. Intersectoral coordination

  iv. Equitable Distribution

- Health care delivery system in India:
  - We have 3 tier system
  - Primary level- PHC, sub-Centre's
  - Secondary level - CHC, TH, district hospitals
  - Tertiary level- medical college, regional centers

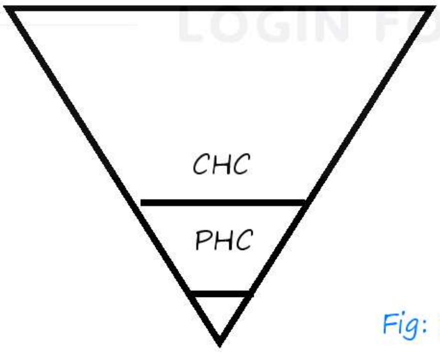

Fig: 1

Fieldworkers

- Population of CHC is 80,000 to 1.20,000. (CHC is required to be staffed by four medical specialists, that is, surgeon, physician, gynecologist/obstetrician and pediatrician supported by 21 paramedical and other staff.)
- Population of PHC is 30,000
- Under 1 PHC on an average there are 5 to6 sub-Centre's
- Population of 1 subcenter is 5000
- In one PHC there will be 1 male health assistant and 1 female health assistant (PHC is to be staffed by a medical officer supported by 14 paramedical and other staff.)
- In sub center we have Multipurpose worker, health worker 1 male and 1 female (Each SC is required to be staffed by at least one auxiliary nurse midwife (ANM)/female health worker and one male health worker as per Indian Public Health Standards (IPHS)).)

First referral units

- An existing facility (district hospital, sub-divisional hospital, CHC) can be declared a fully operational first referral unit (FRU) only if it is equipped to provide round-the-clock services.

  3 critical determinants of a facility being declared as a FRU:

(i) emergency obstetric care including surgical interventions such as caesarean sections

(ii) care for small and sick newborns

(iii) blood storage facility on a 24-h basis.

Field workers 00:10:34

- Asha, Anganwadi worker, trained dai or SBA-Skilled Birth Attendant, village health guides.
- 1 ASHA (accredited social health activist) is for population of 1000
- 1 USHA (urban social health activist) is for 250 - 500 houses i.e. for 1000-2500 population

Suggested norms 00:13:20

- PHC and health assistant (male and female)
  - 1 per 30000 population in plain area
  - 1 per 20000 in tribal and hilly area

Norms of sub centre

- Catered by health worker/ multipurpose worker
- 1 per 5000 population in pain area
- 1 per 3000 population in tribal and hilly area

PHC are of two types:

- Type A- delivery load is less than 20/month
- Type B- delivery load is greater than 20/month

Sub Centre's are of two types:

- Type A- all services except delivery.
- Type B- all services + delivery

Urban family welfare Centre's:

- Type1- 10,000 to 25,000
- Type 2- 25,000 to 50,000
- Type 3- >50,000
  - **Two paramedical staff in 1 and 2 and 6 persons including medical officer in type 3 Centre's**

Tribal health 00:15:38

- Largest tribal population is seen in Madhya Pradesh
- Madhya Pradesh > Maharashtra > Odisha > Rajasthan
- TFR- 2.48
- Sex ratio- 990
- Literacy rate- 59%
- Life expectancy- 63.9
- Institutional deliveries- 68%
- Under 5 Mortality Rate-57.2, neonatal- 31.3
- Tribal men 15-54yrs using tobacco- 72%

HEALTH COMMITTEES AND INTERNATIONAL SUMMITS

i. BHORE COMMITTEE: Integration of preventive and curative services at all administrative levels.
Development of Primary Health Centres (PHC) in 2 stages.
Also known as: Health Survey and Development Committee
  - All the interns after completing the internship should undergo 3 months of training in SPM

ii. Mudaliar Committee (IAS): Create an 'All India Health service' similar to 'Indian Administrative service'
Strengthen existing primary health centers rather than creating new ones.

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iii. Mukherjee Committee
  - Worked on family planning, recommended separate staff for the family planning programme. ...

iv. Jungalwalla Committee also known as the "Committee on Integration of Health Services
Medical care and public health programmes should be put under charge of a single administrator at all levels of hierarchy.
  - Banned private practice
  - Equal pay and special pay

v. Chadha Committee

vi. suggested that the vigilance activity in the NMEP should be carried out by basic health workers (one per

10,000 population), who would function as multipurpose workers and would perform, in addition to malaria work, the duties of family planning and vital statistics data collection.

vii. Kartar Singh Committee: Various categories of peripheral workers should be amalgamated into a single cadre of multipurpose workers (male and female). The erstwhile auxiliary nurse midwives were to be converted into MPW(F) and the basic health workers, malaria surveillance workers etc.

- MPW, removed workers (for W MHW)

viii. Shrivastav Committee

- Semi & para professional worker health education commission, establishment of 3 cadres of health workers namely – multipurpose health workers and health assistants between the community level workers and doctors at PHC, Reorientation of Medical Education (ROME), referral series complex & RHS

World Summits (Health committees at international level)

Millennium Development Goal (MDG) 00:05:18

i. In the year 2000 at UN headquarter NY with 189 leaders → Millennium summit

ii. Agenda → Global health

iii. Set 8 goals which have to be met by 2015

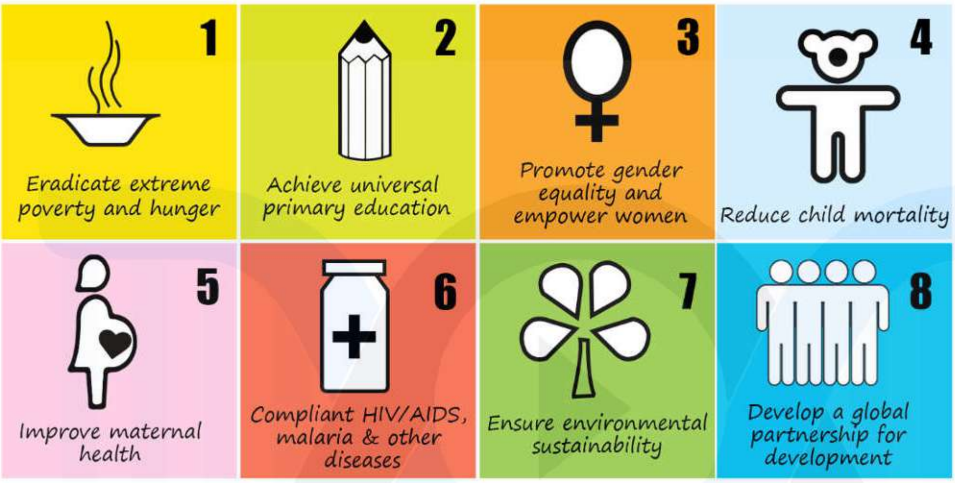
1
Eradicate extreme poverty and hunger
2
Achieve universal primary education
3
Promote gender equality and empower women
4
Reduce child mortality
5
Improve maternal health
6
Compliant HIV/AIDS, malaria & other diseases
7
Ensure environmental sustainability
8
Develop a global partnership for development

Fig: 1

Goal

i. Eradicate extreme linger & poverty

ii. Achieve universal primary education

iii. Promote gender equality and empower women

iv. Reduce child mortality

v. Improve maternal health

vi. Compliant HIV/AIDS, malaria & other diseases

vii. Ensure environmental sustainability

viii. Develop a global partnership for development

- Goal 4, 5 & 6 → are health related

Sustainable development Goals (SDG) 00:11:18

- Came into existence on 25th September 2015
- 193 countries of the UN general assembly
- Agenda → Transforming our world
- Targets → 2030
- 17 Goals
- 169 targets
- 304 indicators

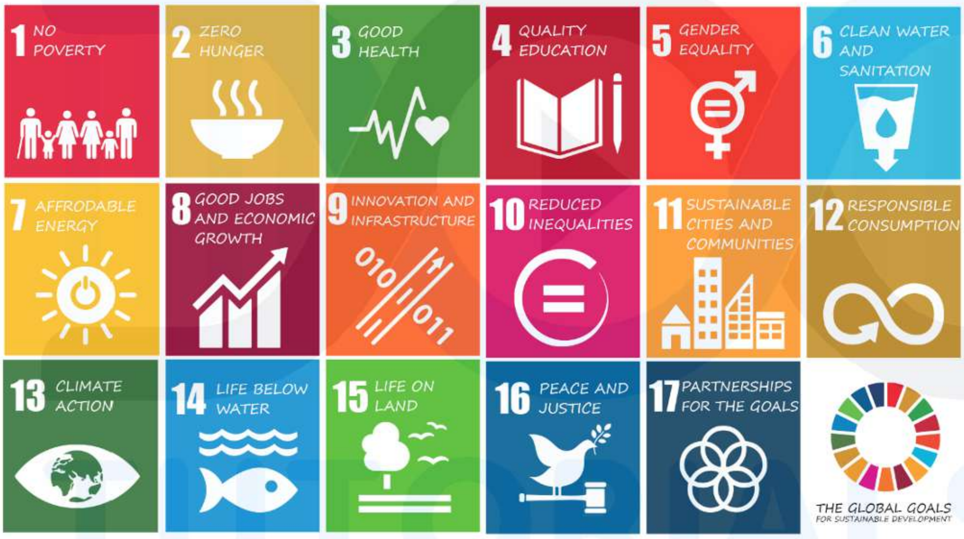
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFRODABLE ENERGY
8 GOOD JOBS AND ECONOMIC GROWTH
9 INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE AND JUSTICE
17 PARTNERSHIPS FOR THE GOALS
THE GLOBAL GOALS
FOR SUSTAINABLE DEVELOPMENT

Fig: 2

Goal 3

- Is the only one of the 17 SDG's, related to health.

The UN has defined 13 Targets and 28 Indicators for SDG 3.

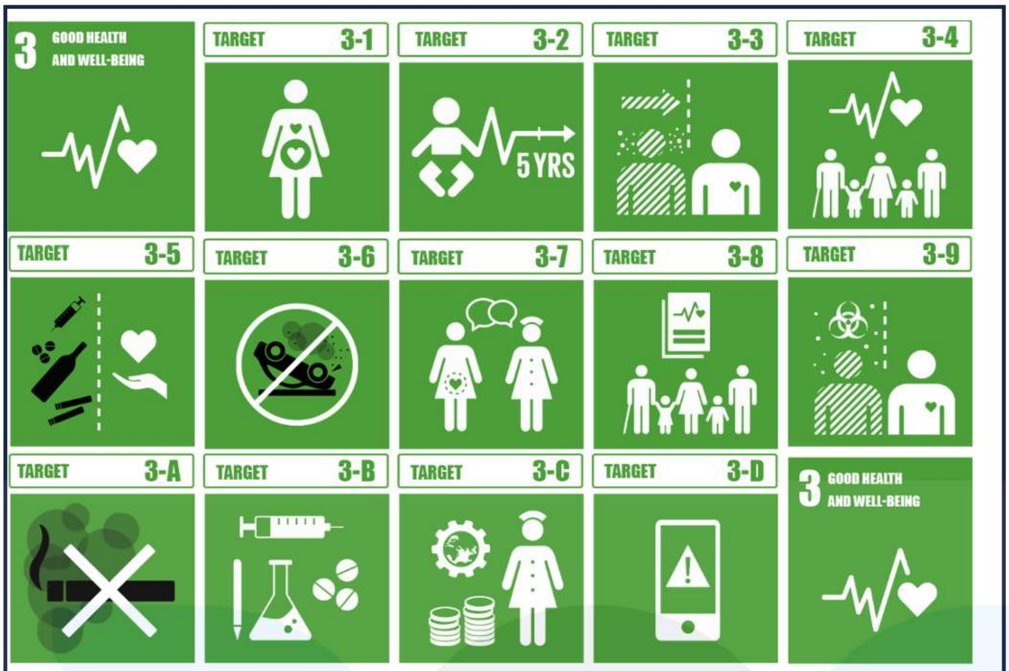
3 GOOD HEALTH AND WELL-BEING
TARGET 3-1
TARGET 3-2
5YRS
TARGET 3-3
TARGET 3-4
TARGET 3-5
TARGET 3-6
TARGET 3-7
TARGET 3-8
TARGET 3-9
TARGET 3-A
TARGET 3-B
TARGET 3-C
TARGET 3-D
3 GOOD HEALTH AND WELL-BEING

Fig: 3

Targets of Sustainable Development Goal 3 to ensure healthy lives and promote well-being for all at all ages

3.1. Maternal mortality

3.2. Neonatal and child mortality

3.3. Infectious diseases.

3.4. Noncommunicable diseases

3.5. Substance abuse

3.6. Road traffic

3.7. Sexual and reproductive health

3.8. Universal health coverage

3.9. Environmental health

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Health care delivery

- Health for all 2000
- Primary health care
- Three tier system
- Field workers
- Health committees
- MDG
- SDG

OCCUPATIONAL HEALTH

- Bernardini Ramazzini – Father of occupational health

BERNARDINUS RAMAZZINUS PROF & MEDICINÆ DOCTOR ÆTATIS LXXXI

Fig: 1

Pneumoconiosis 00:03:00

- Disease affecting lung due to occupational exposure to respirable dust of size **0.5-3μ**

AlfaTaneeh.com

Particle size	Behaviour
1.< 10 μ	Remain suspended in air
2.5-10 μ	Arrested in upper respiratory tract
3.3-5 μ	Deposited in mid respiratory tract
4.1-3 μ	Enter alveoli and settle there

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Brownian movement: showed by particle <1μ

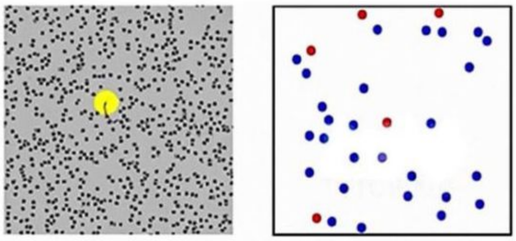


Fig: 2

- Silicosis (Most common)
- Asbestosis
- Anthracosis
- Byssinosis
- Bagassosis
- Farmers Lung

Silicosis

x-ray chest:

- Bilateral perihilar consolidation
- Egg shell calcification of thoracic lymph nodes
  - Also known as Ball of wool/snow storm appearance

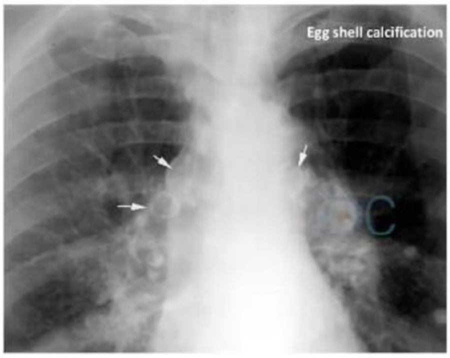


Fig: 3

- Also seen in
  i. Sarcoidosis
  ii. Post Radiotherapy
- Seen among Rock grinders, pot makers
- Hence known as Grinder's disease or Potters rot

Grinder's disease Potters rot Fig: 4

- Other name for silicosis:
  - Pneumonoultramicroscopicsilicovolcanoconiosis (P_{45})

- When silica particles enter the lung

↓

They inhibit the ability of macrophages to kill bacteria

↓

leading to proliferation of bacteria especially Mycobacterium tuberculosis

↓

Silico tuberculosis

But sputum contain less AFB because these are enclosed in fibrotic caseation

Asbestosis 00:11:30

- Due to inhalation of Asbestos fibres
- Asbestos fibres are of two types
  - Serpentine / chrysolite (>90%)
  - Amphibole (Disease causing)

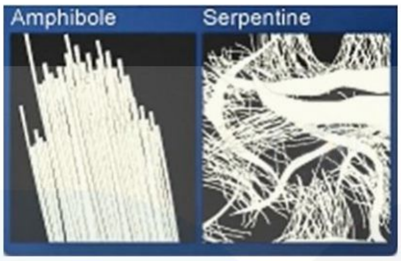


Fig: 5

- It affects lower part of the lung
- Most common malignancy: Mesothelioma, carcinoma bronchus
- X-ray chest:
  - Ground glass appearance-not specific

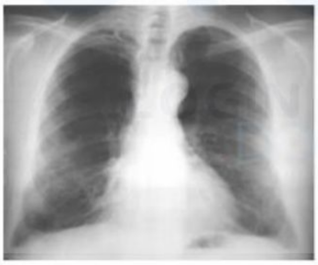


Fig: 6

  - Holly leaf appearance (Pleural plaques)

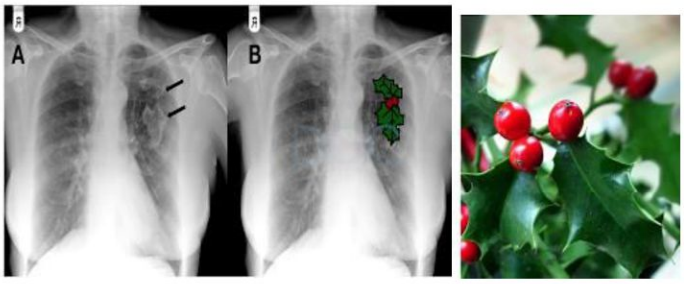


Fig: 7

- Asbestos bodies / Ferruginous bodies: asbestos fibres coated with fibrin

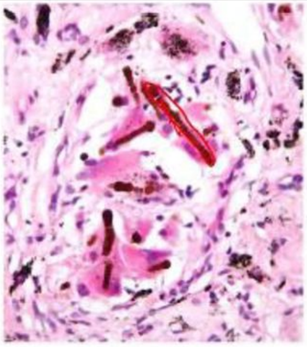


Fig: 8

Anthracosis 00:17:17

- Also known as coal worker's pneumoconiosis
  - Due to Inhalation of coal dust
- Also known as Black lung

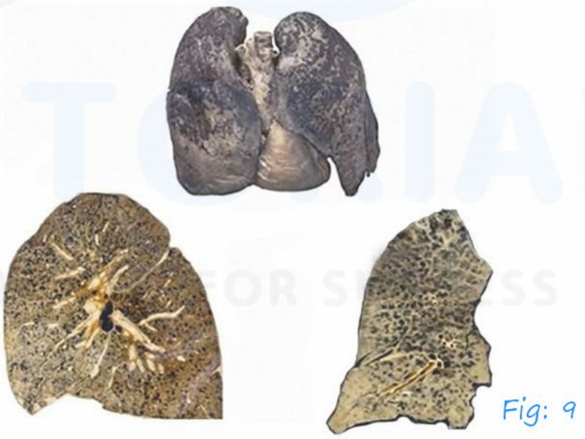
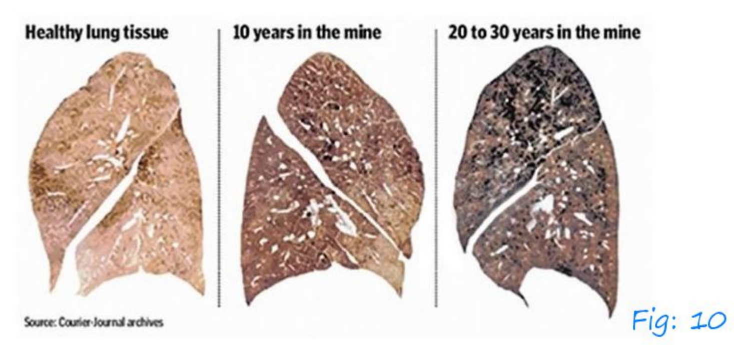


Fig: 9

- Lung is fibrosed
- It has 2 stages
  - Simple pneumoconiosis (>10-12yrs)
  - Progressive massive fibrosis (PMF) (>20yrs)



Source: Courier-Journal archives

Fig: 10

- Beat Knee: Inflammation and swelling of the knee
- Beat Elbow: Inflammation and swelling of the elbow
- Miner's Nystagmus-due to less
- Caplan's syndrome /Caplan's disease: Rheumatoid pneumoconiosis

  (Rheumatoid Arthritis + Pneumoconiosis)

Disease	**Exposure source**
Silicosis	Silica dust
Anthracosis	Coal dust
Asbestosis	Asbestos dust
Byssinosis / Mill fever	Cotton fibre
Bagassosis	Molasses (sugarcane)
Berylliosis	Beryllium
Farmer's lung	Mouldy hay
Siderosis	Iron dust
Stannosis	Tin dust
Bird fancier's lung	Avian / bird droppings
Compost lung	Compost
Lithosis	Stone
Tobaccosis	dust

Antigen involved in Pneumoconiosis:

Disease	Antigen
Bagassosis	Thermoactinomyces sacchari
Farmer's lung	Micropolyspora faeni
Compost lung	Aspergillus
Chemical workers lung	Isocyanates

Q. Respirable dust responsible for pneumoconiosis has a size limit of?

a. < 1μ

b. < 5 μ

c. < 10 μ

d. < 100 μ

Q. Which of the following pneumoconiosis are more prone to develop Tuberculosis?

a. Silicosis

b. Anthracosis

c. Byssinosis

d. Bagassossis

Q. All are features of Silico tuberculosis except

a. High sputum AFB +ve
b. Children of such cases do not get disease
c. Impairment of total lung
d. Nodular fibrosis

Q. Which of the following pneumoconiosis is caused by micropolyspora faeni

a. Silicosis
b. Byssinosis
c. Bagassossis
d. Farmers lung

Q. Thermoactinomyces Sacchari is associated with

a. Tobaccosis
b. Byssinosis
c. Bagassosis
d. Farmer's lung

Q. Bagassosis can be prevented by spraying

a. 10% acetic acid
b. 5% acetic acid
c. 1% propionic acid
d. 2% propionic acid

Q. Minimum duration for developing coal worker's pneumoconiosis?

a. 2-4 years
b. 4-6 years
c. 8-10 years
d. >10 years

Q. Monday morning fever is a common name for

a. Bagassosis
b. Asbestosis
c. Mad Hatter's disease
d. Byssinosis

- Also seen in Metal fume fever
  - Also known as Brass founder's ague or Galvie flu
  - Due to Inhalation of ZnO & Magnesium oxide fumes.
- Mad hatter's disease / Danbury shakes:
  - Due to Inhalation of mercury
  - Clinical feature: tremors, delirium, confusion

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Fig: 11

Q. Snow storm appearance of lungs on CXR is characteristic of

a. Silicosis
b. Anthracosis
c. Pneumoconiosis
d. Asbestosis

LEAD POISONING

- Synonym: Plumbism / Painter's colic / Saturnism / colica pictonium
- Most common source: Gasoline (leaded petrol)
- Most common mode of absorption – Inhalation
- Most common source in children – Toys / paint

Clinical features: 00:02:18

- Earliest sign – FACIAL PALLOR
- Type – microcytic Hypochromic anemia
- Basophilic stippling / punctate Basophilia
  - Ribosomal RNA accumulated in RBC
  - Pathognomonic of lead poisoning

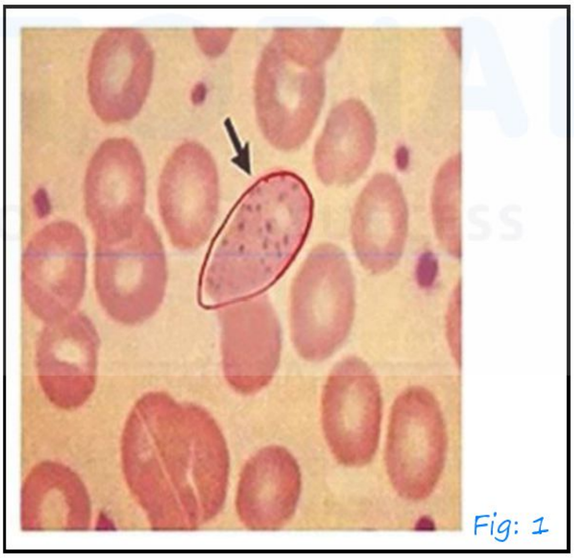

Fig: 1

- Burtonian lines – Blush lines at margin of gum lead sulfide is accumulated

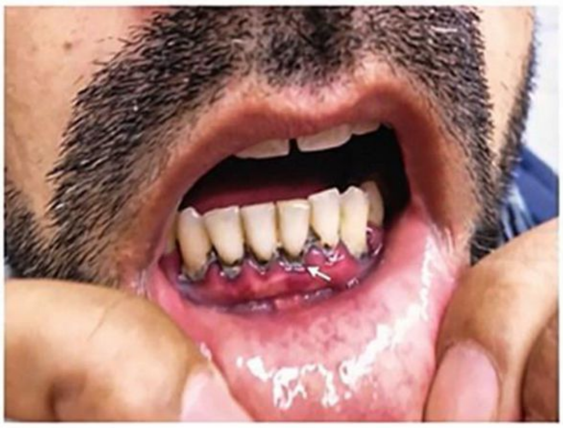

Fig: 2

- Lead palsy: wrist drop → Teleky's sign

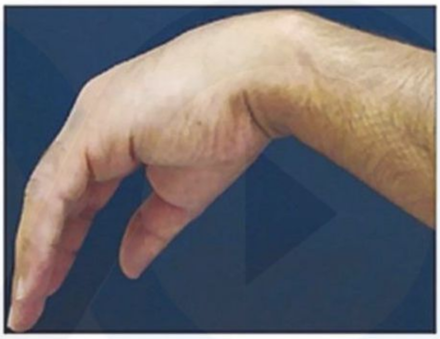

Fig: 3

Mnemonic:

- A → Anemia / Amenorrhea
- B → Basophilic stippling / Burtonian lines
- C → Colic / constipation
- D → drop
- E → Encephalopathy
- F → Facial pallor

Laboratory tests: 00:07:16

- Screening tests: Coproporphyrin in urine (CPU) > 150 μg/L
- Aminolaevulinic acid in urine (ALA) > 5mg/L → Indicates lead absorption
- Lead in urine > 0.8 mg/L → Indicates lead exposure and absorption
- Lead in blood > 70 μg/100ml → Clinical symptoms appear

Uses of lead

- Lead shield / Aprons – to protect from radiation exposure
- Thickness of lead shield – 0.5mm

Fig: 4

Questions

1.Lead poisoning in industries commonly occur by

a. Inhalation

b. Ingestion

c. Skin absorption

d. Conjunctival route

2. All of the following are true occupational lead poisoning except
   a. Inhalation is the most common method of absorption
   b. Lead in blood f urine provide quantitative indication of exposure
   c. Lead poisoning is not a notifiable disease
   d. Basophilic stippling is a sensitive parameter of hematological response

3. Thickness of lead apron to prevent radiation exposure is
   a. 0.1 mm
   b. 0.5 mm
   c. 1 mm
   d. 2 mm

4. 10day rule related to
   a. Sewage disposed
   b. Air quality
   c. Water quality
   d. Radiation protection in pregnancy

5.Unit of absorption radiation in

a. ROENTGEN

b. RAD

c. REM

d. SIEVERT

e. GRAY

6.Maximum permissible level of whole-body occupational exposure to ionizing radiation is

a. 1 rem per year

b. 3 rem per year

c. 5 rem per year

d. 15 rem per year

PREVENTION OF OCCUPATIONAL DISEASES

- Branch of science which deals with occupational diseases called Ergonomics
- there are two laws protecting the health of workers
  - ESI Act
  - Factories act

Ergonomics 00:01:05

- ESI Act
- Factories act
- Previously it was fitting man to the job, now it is fitting job to man

ESIC Act – Employee state Insurance Act 00:02:50

- ESI logo

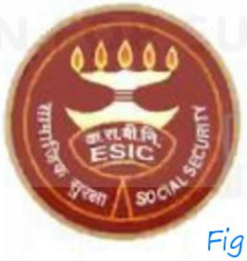

Fig: 1

- Employer–owner
- Employee–worker
- ESI corporation comes under **the ministry of labour and employment**
- the union minister of labour and employment is the chairman of ESIC

Finances

- Employer – 3.25% of total wage bill
- Employee – 0.75% of total wages
- A person with wage < Rs 176/day is exempted from giving any contribution
- State government contributes 1/8th of total medical expenditure and ESI corporation contributes 7/8th

ESI norms

- One doctor dispensary → 1000 family units
- Two doctor dispensaries → 2000 family units
- Diagnostic centre → 5000 family units
- 100 bedded hospitals → 15000 family units
- Eligible if salary is **<21,000 / month**

ESI Benefits 00:10:05

Benefits	Wage	Distribution
Sickness	70%	91 days
Extended sickness (TB,Malignancy,HIV)	80%	2 years
Enhanced sickness (Sterilization)	100%	Male – 7 days Female – 14 days
Maternity	100%	**26 weeks**
Disablement	90%	
Dependents	90%	
Funeral expenses	Rs.15,000/-	

Factories Act 00:15:20

- First introduced in 1948
- Factory definition

  - 10 or more workers if power is used

  - 20 or more workers if power is not used
- If age < 14 years – child and child should not be employed in the factory
- If age > 18 years – adult
- If age 15-18 years – adolescent →need Fitness certificate for working

  (Note – according to WHO – 10-19 years – adolescent)
- One safety officer → 1000 worker
- Welfare officer → 500 workers
- Canteen → 250 workers
- Rest room → 150 workers
- Crèches → 30 or more women workers

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Q. The discipline ergonomics refers to

a. Fitting job to the man

b. Fitting man to the job

c. Industrial hygiene

d. All of the above

Q. Indian constitution has declared that the children less than __ years should not be employed in factories or mines

a. 10
b. 12
c. 14
d. 16

Q. Chairman of ESI in India is

a. Prime minister
b. Union minister of health & family welfare
c. Union minister of labour
d. Union minister of human resource development

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Q. False about ESI in India is

a. Centre contribute 7/8 and state contribute 1/8 part of expenditure
b. A worker with income <70 per day has to pay only 300 per month
c. Funeral expenses are 50,000/-
d. Medical benefit includes full medical care

Q. Under ESI Act, number of units for which a family dispensary must be opened is

a. 5000
b. 1000
c. 1500
d. 2000

Q. Sickness benefit under ESI Act extended into

a. 91 days

b. 61 days

c. 1 year

d.2 years

Sickness absenteeism

- Sickness absenteeism is a useful index to assess state of health of workers

Q. Share of ESI corporation in total expenditure cost of medical care is

a. One-eighth

b. Half

c. Three-fourth

d. Seven-eighth

Q. The Central labour institute, which is an apex institution for training and research in occupational health is situated at

a. Delhi

b. Kanpur

c. Ahmedabad

d. Mumbai

ADULT IMMUNIZATION

- Guidelines for adult immunization framed by

CDC Guidelines

- Different adult vaccine
  1.Td vaccines
  2.Hepatitis B
  3.Hepatitis A
  4.Chicken pox
  5.Pneumococcal vaccine
  6.Meningococcal vaccine
- Td vaccine
  - T – tetanus; d – diphtheria
  - Children – 6,10,14 weeks, 1 ½ years, 5 years, 10 years, 16 years,
  - DPT up to 5 years for children

1) Adult > 18 years – two schedules

Completed routine immunization	Unimmunized
booster every year	5 doses First 3 doses → 0, 1 month, 6 months 4th dose → 1 year after 3rd dose 5th dose → 1 year after 4th dose

- Route – 0.5ml intra-muscular administration
- Provides lifelong immunity: 20-25 years

2) Hepatitis B - three different schedules

i. Normal adults – 0, 1 months, 6 months total of 3 doses

ii. Accelerated schedule – 4 doses 0, 1 month, 2 months, 1 year

iii. Immunocompromised and dialysis patients double dose at 0, 1 month, 6 months

- Dose →
  - ≤ 19 years – 0.5mL intramuscular
  - ≥ 20 years – 1mL intramuscular
  - Site-Upper arm at the insertion of deltoid

3) Hepatitis A

- 2 doses → first dose, gap of 6 to 12 months, receives second dose
- Two separate shots of 0.5 ml for children and 1 ml for adults are required

4) Chicken pox vaccine /Varicella Vaccine

- > 13 years given in 2 doses
  First dose → second dose (after 4-8 weeks)
- Route and dosage – 0.5mL subcutaneous

5) Pneumococcal vaccine

- Two types
  - PPV-23 → pneumococcal poly saccharide protection against 23 serotypes
  - PCV -13 → pneumococcal conjugate vaccine protection against 13 serotypes

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- Schedules

> 65 years
PCV -13 followed by
PPV – 23 after gap of 6-12 months
0.5mL I.M → PCV-13
0.5mL I.M/SC → PPV -23
PCV13 and PPSV23 should not be administered during the same visit, PCV13 should be administered first.

19-64 years with co-morbidities
Example – chronic renal failure, nephrotic syndrome, asplenia, immune compromised
PCV 13 f/b PPV-23 with a gap of 8 weeks
5 years later, 2nd dose of PPV-23

6) Meningococcal vaccine

- Children → 2 doses;
  - 1st dose – 11 to 12 years
  - 2nd dose – 16 years
- Adults – indicated for

1.Travelers
2.Pilgrims
Just one dose given 10 days before travelling

3.Medical conditions

  - 2 doses – 8 weeks apart followed by booster dose every 5 years.

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UPDATES IN COVID-19 VACCINE

Rationale of Vaccination 00:01:12

i. Individual level – prevents COVID -19 disease.

ii. Community level – stop the outbreak by attaining **herd immunity.**

Mechanism of Action 00:03:59

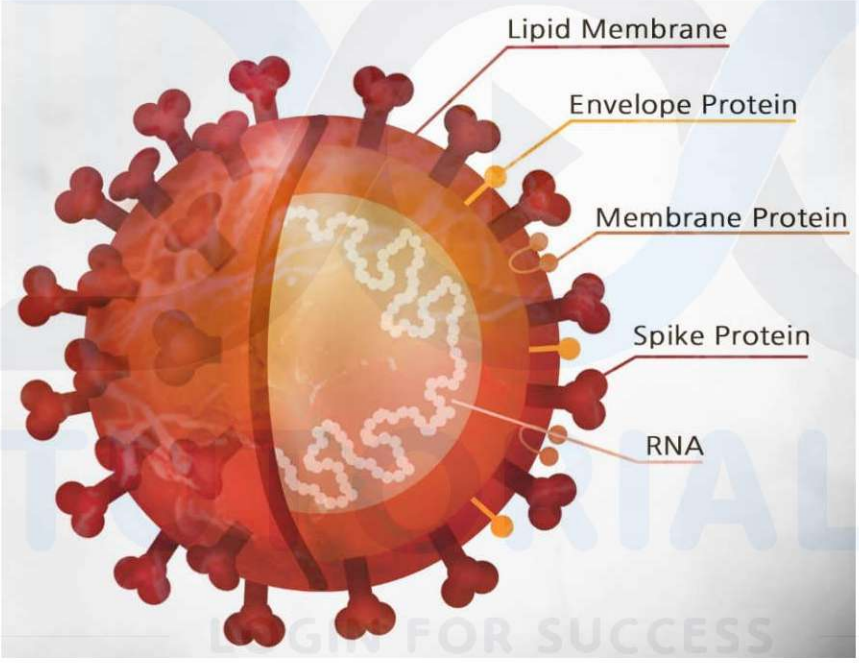

Lipid Membrane
Envelope Protein
Membrane Protein
Spike Protein
RNA

Fig: 1

- Known as SARS Cov-2
- Family – Corona family
- Diseases caused by corona family.
  i. SARS – Severe Acute Respiratory Syndrome
  ii. MERS – Middle East Respiratory Syndrome
  iii. COVID-19

- Spike protein – Virus attaches to **ACE-2** receptor [Most important step in the entry of virus into the body]
- Majority of the vaccines produce

↓

Anti spike protein antibody

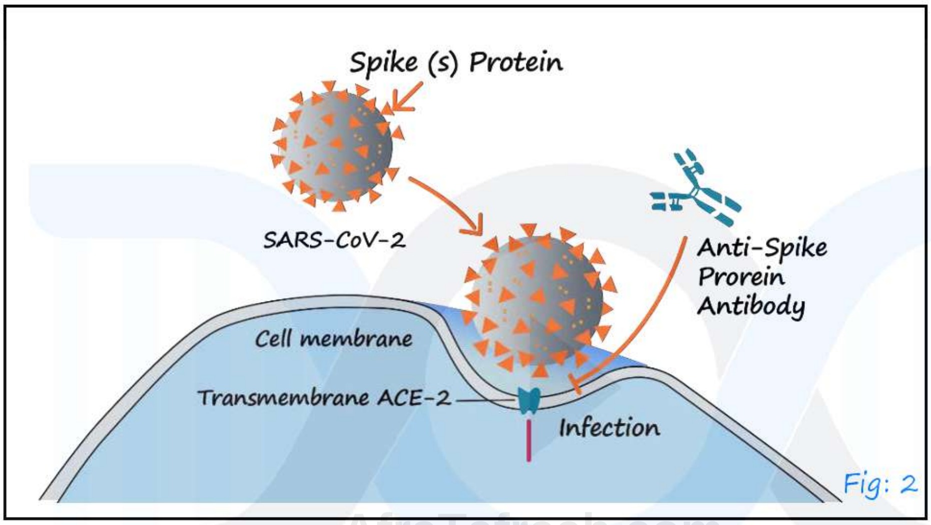

Spike (s) Protein
SARS-CoV-2
Anti-Spike Prorein Antibody
Cell membrane
Transmembrane ACE-2
Infection

Fig: 2

COVID-19 Vaccines 00:07:13

i. Viral vector vaccine

ii. RNA vaccine

iii. Protein based vaccine

iv. Inactivated/killed vaccine

i. Viral vector vaccine

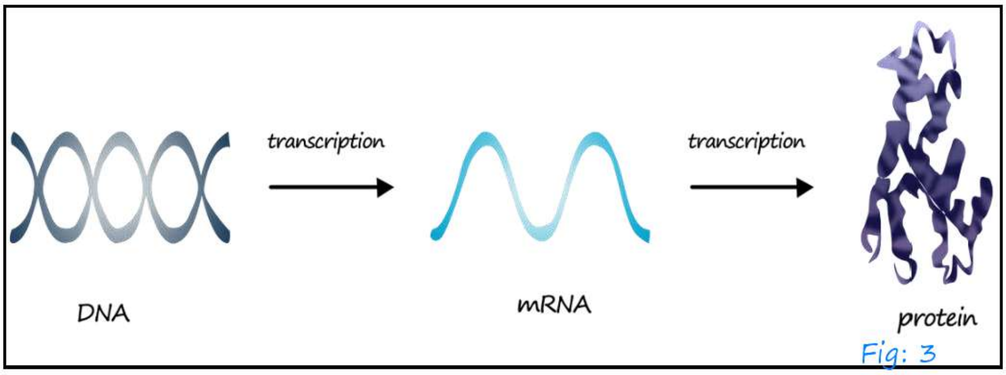

transcription
transcription
DNA
mRNA
protein

Fig: 3

- Uses a part of DNA of Adeno virus that contains a gene that codes for production of spike protein.

ii. RNA viruses

- Use mRNA that codes for spike protein
- Carriers – lipid nanoparticles

iii. Protein based vaccines/ subunit vaccine

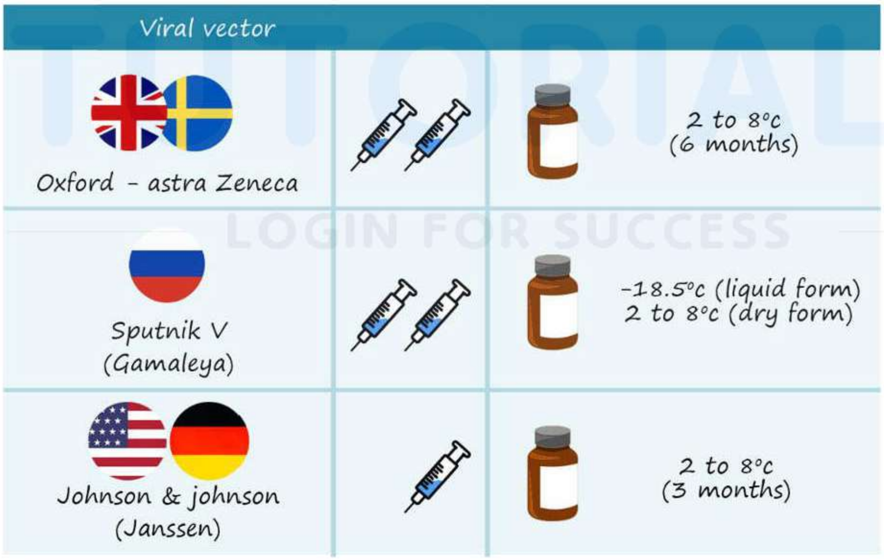
- Use purified spike protein in the vaccine. Using nanoplastic technology

iv. Killed vaccine/Inactivated

- Used killed whole virus inside the vaccine

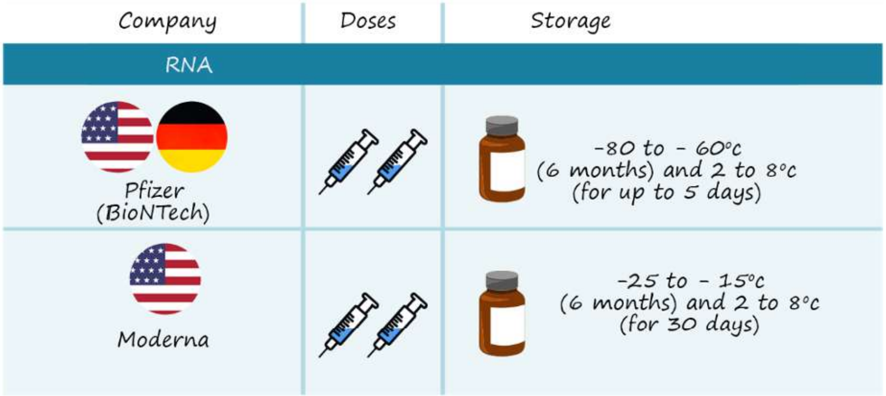
Examples

i.



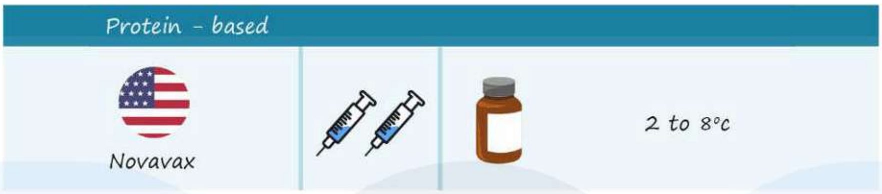
Viral vector			
Oxford - astra Zeneca	💉💉		2 to 8°c (6 months)
Sputnik V (Gamaleya)	💉💉		-18.5°c (liquid form) 2 to 8°c (dry form)
Johnson & johnson (Janssen)	💉		2 to 8°c (3 months)

ii.



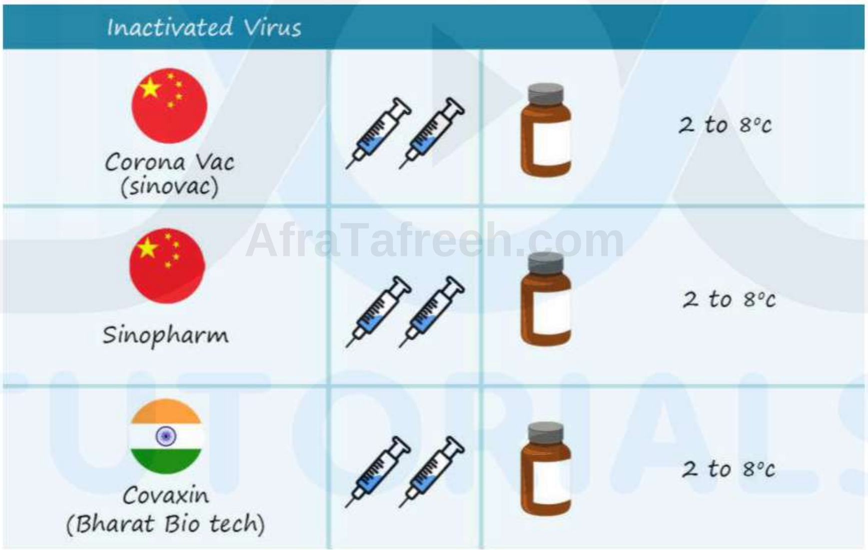
Company	Doses	Storage
RNA		
🇺🇸 🇩🇪 Pfizer (BioNTech)	💉💉	-80 to - 60°c (6 months) and 2 to 8°c (for up to 5 days)
🇺🇸 Moderna	💉💉	-25 to - 15°c (6 months) and 2 to 8°c (for 30 days)

iii.



Protein - based		
🇺🇸 Novavax	💉💉	2 to 8°c

iv.



Inactivated Virus		
🇨🇳 Corona Vac (sinovac)	💉💉	2 to 8°c
🇨🇳 Sinopharm	💉💉	2 to 8°c
🇮🇳 Covaxin (Bharat Bio tech)	💉💉	2 to 8°c

Vaccines approved for emergency use in India

00:20:07

i. Covishield

Fig: 4

- Each vial has 10 doses
- Produced by **oxford – Astrazeneca**
- In India – produced by serum institute of India
- Viral vector vaccine – **Chimpanzee Adenovirus**
- Strain – ChAdOX1 n COV-19 Corona virus vaccine (recombinant)
- Schedule

  - 0.5 ml
  - Intramuscular
  - 2 doses – 12-16 weeks

- Efficacy – when given 4 weeks apart

↓

4 Weeks apart – 70% efficacy
12 weeks apart – 82% efficacy

ii. COVAXIN

- Produced by **Bharat Biotech – India**
- Strain – NIV-2020-770
- Has 29 proteins of SARS – COV-2
- Schedule
  - 0.5 ml
  - Intramuscular
  - 2 doses – 4 weeks apart
- Efficacy – 81% efficacy

iii. Sputnik – V

- Develop by moscow's **Gamaleya Research Institute of Epidemiology & Microbiology**
- Dr. Reddy's Lab – Distributions in India
- Viral vector vaccine

Human Adeno virus 26	Human Adeno virus 5

- Schedule –
  - 2 doses
  - 21 days to 3 months apart
  - 1st shot uses adenovirus 26
    2nd shot uses adenovirus 5
- Efficacy – >90% efficacy

Contraindications 00:28:25

i. Allergy to either food/medicines/vaccines

ii. Allergy to 1st dose of any vaccine

iii. Pregnancy

Temporary contraindications 00:30:01

i. Acutely unwell and hospitalized patients due to any illness have to wait for **1-2 months**

ii. Covid positive individuals – **3 months post COVID – negative result**

Side Effects 00:31:42

i. Very common (may effect more than 1 in 10 people)

- Tenderness
- Pain
- Redness
- Itching
- Swelling/Bruising at the site of infection
- Fatigue
- Fever
- Headache

ii. Common (may affect upto 1 in 10 people)

- Lump at injection site
- Fever
- Vomiting

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iii. Uncommon (may affect upto 1 in 100 people)

  - Dizzy
  - Decreased appetite
  - Abdominal pain
  - Enlarged lymph nodes
  - Sweating/rash

Expiry 00:33:00

- Upto 6 months
- How long can they be kept outside cold chain – **6hrs.**
- When does protective immune response develop – **14 days following 2 doses**
- Duration of protection → minimum **9 months – 12 m**

COVID Vaccine in Children 00:34:31

- Pfizer/Bion tech vaccine – for children **≥ 12 years**

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Nasal Vaccine in Covid 00:35:39

- **BBV154**
- Produced by Bharath Biotech and university of Washington school of medicine.
- Single dose → spray/drops
- Virus vector – **Chimpanzee adenovirus**
- Advantages
  - Acts at the site of infection (nose)
  - Prevents infection like any other vaccine

- Prevents transmission as well
- No need for a trained health care worker
- Low cost

Vaccination Strategy Adopted in India 00:38:14

i. Health care workers (HCWs) → **16th Jan 2021**

ii. Frontline workers (FLWs) → **6th Feb 2021**

iii. >60 Yrs & 45-49 (with Comorbidities) → **1st march 2021**

iv. >45 years → **April 1st 2021**

v. >18 years → **1st may 2021**

Challenges of Vaccination 00:40:06

i. Vaccine supply

ii. Cold chain

iii. Vaccine hesitancy

iv. Variants/mutant strains → Immune escape

Eg – UK kent strain
Brazilian
South African
Recent double & triple mutant strains found in India

Covid Virus Variants 00:42:25

i. Variant of Interest (VOI)

- Genetic lineage is different from original strain

Possible attributes of a variant of interest:

- Specific genetic markers that are predicted to affect transmission, diagnostics, therapeutics, or immune escape.
- Evidence that it is the cause of an increased proportion of cases or unique outbreak clusters.
- Limited prevalence or expansion in the US or in other countries

WHO Label	Pango Lineage	GISAID clade/lineage	Nextstrain clade	Earliest Documented Samples	Date of designation
Epsilon	B.1.427/ B.1.429	GH/452R/V1	21C	Unites States of America Mar – 2020	5 – Mar – 2021
Zeta	P. 2	GR/484K. V2	20B/S. 484K	Brazil Apr – 2020	17 – Mar – 2021
ETA	B.1.525	G/484K. V3	21D	Multiple countries, Dec – 2020	17- Mar – 2021
Theta	P.3	GR/1092K. V1	21E	Philippines, Jan – 2021	24 – Mar – 2021
Lota	B. 1. 526	GH/253G.V1	21F	Unites States of America,	24 – Mar – 2021

				Nov – 2020	
Kappa	B. 1. 217. 1	G/452R. V3	21B	India, Oct – 2020	4 – Apr – 2021
Lambda	C.37	GR/452Q. V1	20D	Peru, Aug – 2020	14 – Jun – 2021

ii. Variant of concern (VOC)

Possible attributes of a variant of concern:

In addition to the possible attributes of a variant of interest

Evidence of impact on diagnostics, treatments, or vaccines

- Widespread interference with diagnostic test targets
- Evidence of substantially decreased susceptibility to one or more class of therapies
- Evidence of significant decreased neutralization by antibodies generated during previous infection or vaccination
- Evidence of reduced vaccine-induced protection from severe disease
  - – Evidence of increased transmissibility
  - – Evidence of increased disease severity

WHO label	Pango Lineage	Earliest Documented Samples
Alpha	B117	United Kingdon Sep 2020
Beta	B1351	South Africa May 2020
Gamma	P1	Brazil Nov 2020
Delta	B16172	India Oct 2020

- Variant that causes increased severity of transmission/complications/deaths.

iii. Variant of high consequences (VOHC)

- Absent in India.

- Possible attributes of a variant of high consequence:
- In addition to the possible attributes of a variant of concern
  - Impact on Medical Countermeasures (MCM)
  - Demonstrated failure of diagnostic test targets
  - Evidence to suggest a significant reduction in vaccine effectiveness, a disproportionately high number of infections in vaccinated persons, or very

low vaccine-induced protection against severe disease

- Significantly reduced susceptibility to multiple Emergency Use Authorization (EUA) or approved therapeutics
- More severe clinical disease and increased hospitalizations

Strategies for COVID-19 Prevention 00:46:45

- Vaccination
  ↓
  SMS
- Soap
  Covid-19
- Mask
- Social Distancing

100% prevention from

TUTORIALS
LOGIC FOR SUCCESS

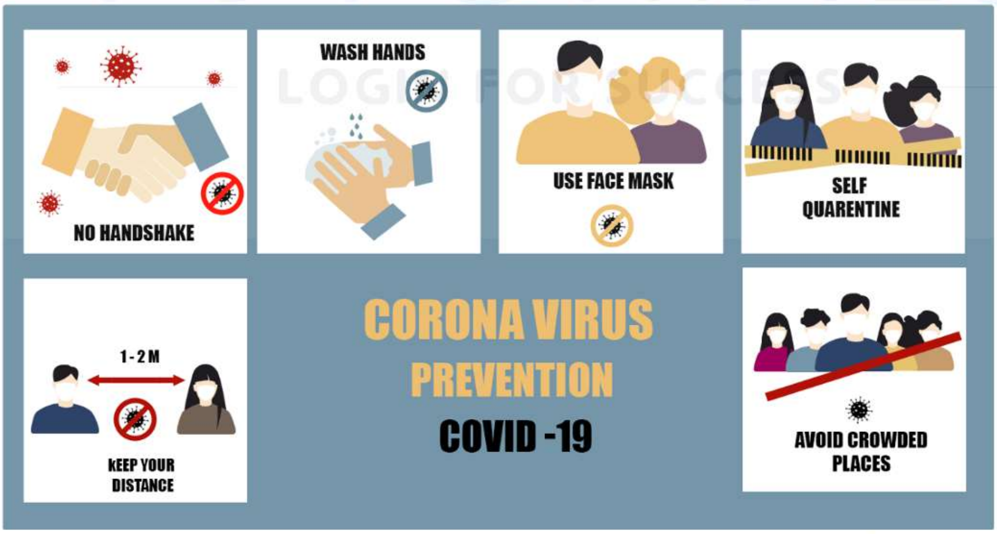

NO HANDSHAKE
WASH HANDS
USE FACE MASK
SELF QUARENTINE
1-2 M
KEEP YOUR DISTANCE
CORONA VIRUS
PREVENTION
COVID -19
AVOID CROWDED PLACES

Fig: 5

NETWORK ANALYSIS

- It is a diagram in which various steps of a project are arranged from first step till last step along with time taken for each step

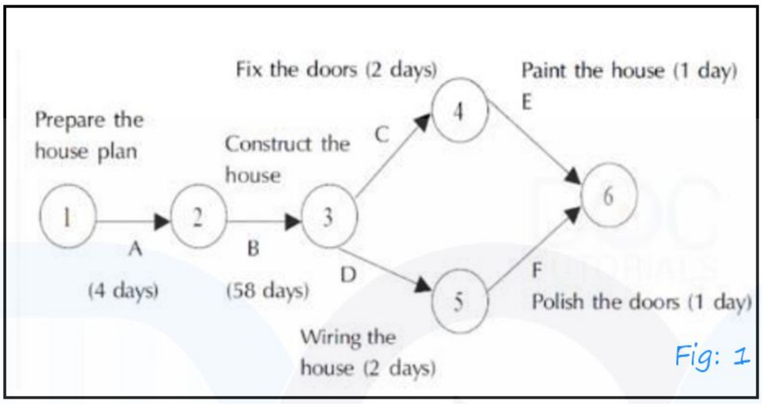

Fix the doors (2 days)
Paint the house (1 day)
Prepare the house plan
Construct the house
C
E
1
2
3
4
5
6
A
(4 days)
B
(58 days)
D
F
Polish the doors (1 day)
Wiring the house (2 days)

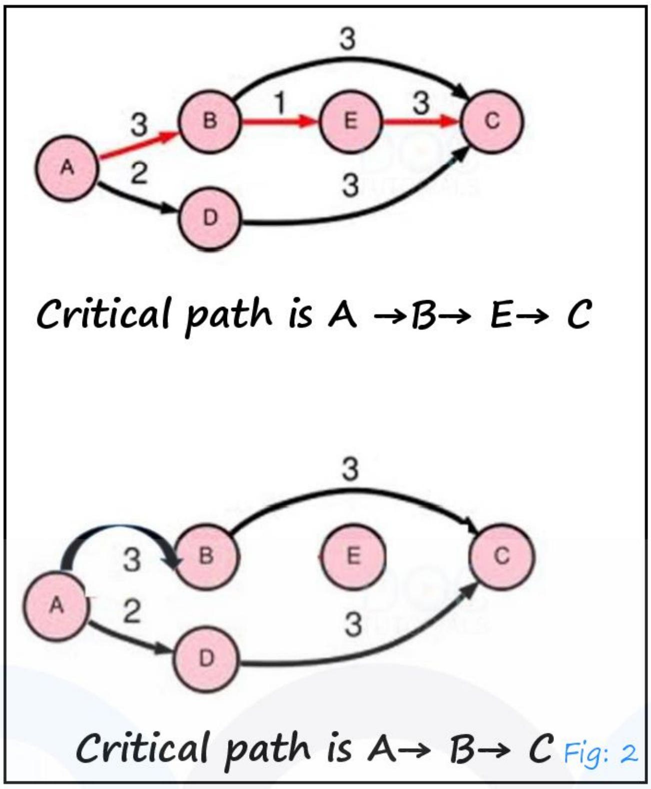
Fig: 1

- Time taken for whole project is given by network analysis

Types of network analysis 00:02:50

- PERT – programmed evaluation and review technique
  - Done by beginner
- CPM – Critical path method
  - Done by expert
- Critical path – Longest path of the network is called critical path

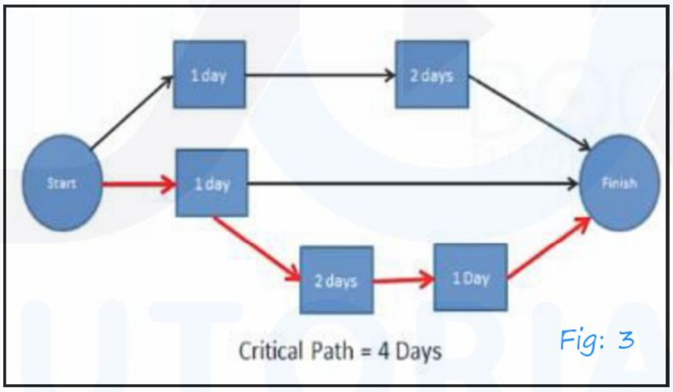
  (Rate limiting)
- If you can reduce the time taken for the critical path we can reduce the time for the whole project


3
3
B
1
E
3
C
A
2
D
3
3
B
E
C
A
3
2
D
3

Critical path is A →B→ E→ C

Critical path is A→ B→ C

Fig: 2


1 day
2 days
Start
1 day
Finish
2 days
1 Day

Critical Path = 4 Days

Fig: 3

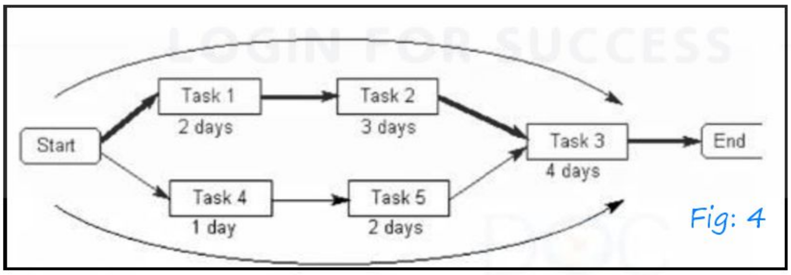

Task 1
2 days
Task 2
3 days
Start
Task 3
4 days
End
Task 4
1 day
Task 5
2 days

Fig: 4

- Q. Time taken for any project is estimated by

  a. Work sampling

  b. Input-Output

  c. Network analysis

  d. Systems analysis

EVALUATION OF HEALTH SYSTEM

Evaluation: -

- Done At the end of the planning
- Achieve your objectives and Quality
- Components: - These are 7 components

  1.Relevance

  2.Adequacy → full / complete

  3.Accessibility

  4.Acceptability → Socially, culturally and economically

  5.Efficacy→ How well resources are utilized

  6.Effectiveness: - Alleviation of an underlying problem

  7.Impact: - Effect of service on health

- 7-1R 3As 2Es 1 I

A. All are elements of evaluation except

a)Repeatability

b)Relevance

c)Acceptable

d) Effectiveness

B.Which of the following explains how well her sources are utilized?

a. Efficiency

b. Effectiveness

c. Impact

d. Adequacy

PLANNING CYCLE

Health planning and management

- Management → for today
- Planning → for tomorrow
- Minimum resource → maximum output

Goal:

- Dream / ultimate desire
- Features: -
  - Not always achievable
  - Not always measurable
  - Not always time-bound

Objective:

- End point of your plan
- Features: -
  - Achievable
  - Measurable
  - Time-bound

Target:

- Activity within the plan
  - Goal

    ↓

  - Objectives → Targets

TUTORIALS LOGIN FOR SUCCESS

NPP-National population policy

- Goal: - To stabilize population
- Objectives: - NRR=1, TFR=2.1, CPR-60%
- Target: - Cut, condoms, sterilization

Planning cycle 00:11:04

- 8 steps
  - Step 1: - Analysis of Health Situation, Diseases prevalent in community

  Ex: ADD
  Malnutrition
  NCD

  - Step 2: - Setting goals and objectives
  - Step 3: - Assessment of resources

  ↓

  - 5 resources → 4M, 1I

- M1 - manpower
- M2 – money
- M3 – Material
- M4 – Minutes
- I – Information
  - Step 4: - Fixing priorities (APD)
  - Step 5: - Formulate plan
  - Step 6: - Program and Implement
  - Step 7: - Monitoring
  - Step 8: - Evaluation

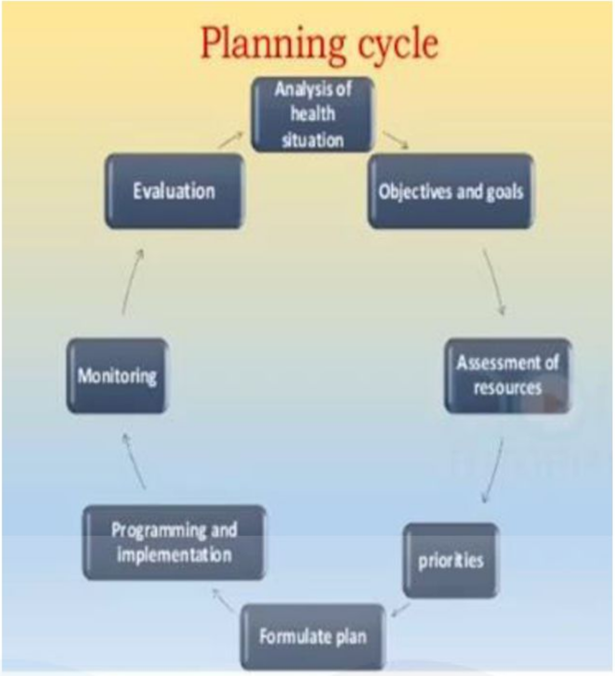

Planning cycle
Analysis of health situation
Objectives and goals
Assessment of resources
priorities
Formulate plan
Programming and implementation
Monitoring
Evaluation

Fig: 1

Pre-planning 00:20:27

- G – Government interest
- – Organization for planning
- A – Administration
- L – Legislation (law)

सत्यमेव जयते
NITI Aayog

Fig: 2

- NITI Aayog → National Institute for Transforming India
- Formed in Jan 2015
- Headed by the prime minister of India

1. Which of the following is a set point framed for long-term plans but is yet something that cannot be quantified or measured?
   a. Target
   b. Goal
   c. Objective
   d. Mission

2. Which of the following statements best explains the purpose of planning?
   a. To match the limited resources with many problems
   b. To eliminate wasteful expenditures
   c. To develop the west resource of action to accomplish a defined objective
   d. All the above

3. Planning cycle has got several steps
   A. Monitoring and evaluation
   B. Programming and implementation
   C. Assessment of resources
   D. Analysis of existing health situation
      a. ABCD
      b. DCBA
      c. DBCA
      d. CDBA